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COMPUTERWORLD

INSIDE

Spotlight — Like death and taxes, there is no escaping the inevitability of LANs. Center pullout section.

In Depth — C. J. Date defines the true distributed data base. **Page 75.**

Comdex/Spring highlights: IBM details elements of data manager and communications manager components of OS/2; Hayes shakes up modem line; and board makers tenuously feel their way toward PS/2 connections. Pages 111-113.

CDC ready to roll out enhanced Fortran compiler and 12M byte/sec. disk drive for high-end Cybers. Page 4.

NCC continues to slip; Britton Lee holds announcement plans for vertical show. Page 2.

Focus users blitzed by Information Builders' largest set of announcements in its history. Page 5.

Limp prospects lead Floating Point Systems to trim work force by one-third. Page 89.

MIPS, FLOPS, loops and Dhrystones — everybody hates them, but nobody is willing to give them up. Page 61.

IBM clarifies conflicting statements on availability of performance "tuning" for 9335 disk drives and controllers. Page 6.

Wang skirted own ban, shipped to S. Africa

Deliveries ran through 1986; users say products still available through Johannesburg distributor

BY CLINTON WILDER
CW STAFF

Despite Wang Laboratories, Inc.'s 1985 self-imposed ban on product sales to South Africa, the company confirmed last week that it shipped products to the apartheid-torn nation until the end of 1986 through a Florida export firm.

In addition, it has been learned that Wang computers, including recent product releases, apparently are still generally available through its former distributor, Johannesburg-based General Business Systems.

Last week, responding to *Computerworld* inquiries, Wang confirmed for the first time that it had a remarketing agreement between late 1985 and Dec. 31, 1986 with Southern Star Trading Corp., a Fort Lauderdale, Fla., export firm, which bought products directly from Wang and sold them in the South African marketplace.

Contradicted policy

Although the statement said Wang required Southern Star to comply with U.S. government sanctions prohibiting computer sales to certain South African government agencies, the remarketing agreement directly contradicted Wang's firmly stated corporate policy against all product sales to South Africa after 1985. That policy was cited by Wang founder and Chairman An Wang in his 1986 book, *Lessons*:

"As someone from a race which has suffered its share of discrimination, I could hardly ignore the abuses of apartheid," Wang wrote. "... So we took the step of selling the subsidiary

"I severed our last remaining connection to South Africa. Finally I decided that we had no choice but to do so."

TAKEN FROM *LESSONS*, BY AN WANG AND EUGENE LINDEN

... This reduced our direct presence, although we still sold equipment through this distributor. We maintained this relationship until [1985]. I had hoped that things in South Africa would change over this period. But they didn't, and I began to feel that they never would unless people like myself made stronger statements. So I severed our last remaining connection to South Africa."

The policy was reiterated for Wang's international managers in a Nov. 7, 1986, memo written by Ken Olisa, then marketing director for Europe, Africa and the Middle East.

Even after Wang's agreement with Southern Star ended, GBS has continued to market and sell Wang products, according to South African data processing executives and articles in the South African business press. South African users say there is rarely any difficulty in procuring Wang's recently released products through GBS, although a Wang spokesman denied that Wang itself is the current source.

"They may have said that for political reasons, but we can obtain that equipment easily," said Cees Roon, president of South Africa's Computer Users Council. "It is still distributed by GBS; the only difference is that GBS is now a private company. It does not come here via backdoor methods."

Continued on page 6

Merger giant swallows Uccel

BY ALAN ALPER
CW STAFF

NEW YORK — Computer Associates International, Inc., which through acquisitions has built itself into the world's largest independent software company, last week moved to make its biggest purchase ever by acquiring systems software rival Uccel Corp.

The $800 million blockbuster acquisition, which took the industry by surprise, is expected to be consummated sometime near August 15 and would make Computer Associates a $650 million company, according to analysts' estimates (see related stories page 8). That is more than double the size of its largest competitor, Microsoft Corp.

In acquiring Dallas-based Uccel, Computer Associates would strengthen its already solid hold on the systems software marketplace. Uccel has an installed base of some 20,000 customers, many of whom would be added to Computer Associates' 26,000 clients who make up an installed base of more than 70,000 products.

More important for Computer Associates, which reported revenue of $309.3 million in fiscal 1987, the planned acquisition would eliminate its major competitor in the systems software arena.

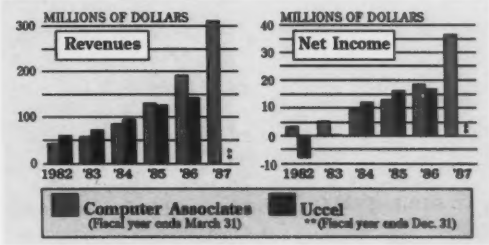
The deal would also bolster the Garden City, N.Y., company's foothold in the applications software arena. Approximately 25% of Uccel's $141.6 million revenue last year was derived from application packages sold to the financial community.

With the acquisition, Computer Associates would pick up capacity planning, performance measurement and data center administration software — areas in which it has products on the drawing board — and thus would not have to spend money to develop such products, according to Computer Associates Chairman Charles Wang.

Yet because the two companies compete so closely in a variety of systems software product areas, some analysts said they are hard-pressed to see the

Continued on page 8

Computer Associates and Uccel
Revenues and net income



CW CHART

Ashton-Tate shooting for host link-up

BY DONNA RAIMONDI
CW STAFF

Poised to strike at the micro-to-mainframe market, Ashton-Tate is readying a series of data extraction products that would link its Dbase III software to data bases on IBM and Digital Equipment Corp. hosts.

According to Wayne Walker, communications products manager, the products will compete with Lotus Development Corp.'s The Application Connection product. TAC automatically extracts data from a variety of IBM mainframe data bases and downloads it to a PC without requiring the user to leave the micro session. The Dbase Direct/36 product lets Dbase users access information on an IBM System/36

Continued on page 111

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IN THIS ISSUE

New focus. Information Builders' PC, mini and mainframe product blitz centers around a new release of PC Focus and includes a window-driven application generator, natural language query system and interface to Dbase III files. Page 5.

Pledge of allegiance. DEC, Cray ally to develop faster interface between VAX minis and X-MP supercomputers. Page 114.

NEWS

4 CDC enhances Cyber 180 990E mainframes.

4 AST Research rolls out boards for PS/2 Models 50 and 60.

4 Microsoft drafts QuickC into language war.

6 IBM clarifies conflicting 9335 statements.

6 Are sales of Wang products still GBS's lifeblood?

8 Reactions to Uccel, Computer Associates marriage mixed.

8 Fate of Uccel's financial software arm uncertain.

10 Mitek targets Telenet software at TSO users.

12 Sun offers faster IBM links.

13 AT&T offers PBX with backup processor.

13 Unisys creates Linc-based banking application.

14 Compaq adds disk caching to PC line.

14 Computerland chain sold to venture banking firm.

15 Banks' paper shuffling gives way to automation.

18 DG integrates PCs to corporate networks.

111 *Computerworld* presents awards at Comdex.

111 Hayes' Comdex unveilings include 9.6K bit/sec. modem.

112 IBM stops taking dealer orders for most XTs.

112 IBM describes Database Manager for OS/2 Extended Edition.

112 OS/2 Communications Manager detailed.

113 Comdex sponsor launches new show.

113 DCA announces PS/2 versions of IBM terminal emulation products.

113 AT&T Starlan sales called anemic.

113 Quadram develops multifunction card for PS/2.

114 Montreal holding company to acquire Lisp Machines' assets.

A frame to hang your distributed data base on. Page 75.

SOFTWARE & SERVICES

27 Sybase users spot DBMS's potential.

27 Excellink/Host-V lets PC users access host as VTAM application.

27 Consultants say CASE tools misused.

MICROCOMPUTING

41 Microrim exec discusses data base competition under OS/2.

41 Cordata unveils PC with built-in montior.

41 Persoft develops textual organization tool for PCs.

NETWORKING

51 LANS are hot, ISDN is not.

51 BBN, Bell Atlantic add to packet-switching offerings.

51 DCA gate ties PCs on Token-Ring to mainframe.

51 MCI, Sprint speak out against AT&T.

SYSTEMS & PERIPHERALS

61 Census Bureau counts on VAXs.

61 How effective are benchmarks?

61 System Industries develops compact drive for DEC superminis.

Quotable

"OS/2 is the future and the future is limited."

SEYMOUR MERRIN
PRESIDENT
MERRIN RESOURCES

MANAGEMENT

83 Baxter Travenol offers ordering system as EDI for health care field.

83 Development team boosts reliability in assessor's office.

COMPUTER INDUSTRY

89 Datapoint names new CEO.

89 Floating Point trims work force, consolidates operations.

89 Wyse reaches acquisition agreement with Link Technologies.

89 Cadam lessens dependency on IBM.

EMPLOYMENT TODAY

98 Petro firms use MIS to salvage slumping business.

SPOTLIGHT

Local-area networks have made cooperative processing a reality, but software to exploit its potential is lacking.

Follows page 58.

IN DEPTH

75 Twelve rules by which to measure a truly distributed data base. By C. J. Date.

OPINION & ANALYSIS

23 Wohl watches NCC weather changing climate.

27 Vacca thinks AI diagnoses MVS problems.

41 Zachmann finds a cure for C-sickness.

51 Adrian hails accelerating LAN installation.

61 Connolly says rumors of 4381's death are greatly exaggerated.

83 Ludlum suggests cures for NCC's ills.

89 Wilder goes out to the industry ball game.

DEPARTMENTS

22 Editorial

85 Calendar

106 Buy Sell Swap

Britton Lee quits NCC

Delays high-end intro until July Fincom show

BY ALAN J. RYAN
CW STAFF

LOS GATOS, Calif. — Britton Lee, Inc. last week said it has abandoned its plans to exhibit at the National Computer Conference (NCC) and will instead concentrate its efforts on the National Fincom Show in New York next month.

Britton Lee had planned to announce a high-end system at NCC, which will be held June 15-18 at Chicago's McCormick Place, but said it will now announce that product in New York. Scott Humphrey, Britton Lee's director of marketing communications, said the move was made in response to the declining number of attendees and exhibitors at NCC and also because the company has decided to focus its marketing dollars on vertically oriented shows.

"We want to make our product announcement in a community where we have been very successful of late," Humphrey said, referring to the Wall Street area, where Britton Lee's customer list includes Goldman, Sachs & Co. and Drexel Burnham Lambert, Inc.

At Fincom, slated for July 22-23 at New York's Javits Convention Center, Britton Lee said it will take the wraps off its BL8000 Shared Database System, which reportedly utilizes relational data base technology. The system has been under development for more than three years and is said to offer a performance improvement of up to 10 times over the company's current high-end system.

"NCC has been a very good show for us in the past and will hopefully be part of our plans in the future," Humphrey said. He said Britton Lee would be targeting its efforts at vertically oriented shows through the remainder of this year and in 1988 and stressed that the postponement of the product announcement is not based on any product or development problems.

Smuggling charged in Exodus arrest at O'Hare

BY DONNA RAIMONDI
CW STAFF

CHICAGO — A West German man arrested at O'Hare International Airport last week has been charged with smuggling computer equipment out of the country.

Levente Laszlo, a computer business owner from Bonn, West Germany, was arrested by U.S. Customs Service agents who said they confiscated $46,000 worth of Digital Equipment Corp. components — including Ethernet interface boards and transceivers and VAX-11/780 parts. The shipment was part of a $250,000 purchase Laszlo allegedly made in Chicago for shipment to Hungary, federal customs agents said.

A complaint filed in U.S. District Court here charged that Laszlo has been acquiring computer equipment from the U.S. and western European countries for end users in Hungary. The arrest is part of the Customs Service's ongoing Operation Exodus, a 6-year-old effort that focuses on illegal shipments of advanced high-technology equipment to Soviet bloc countries.

The U.S. Department of Commerce has refused to permit shipment of sophisticated computer equipment to Eastern bloc nations because of the possibility that it will be used for military purposes. The equipment is reportedly used for weapons systems and to block U.S. weapons systems.

Reaped $4.4 million

Laszlo reportedly has earned more than $4.4 million for his efforts in the past year. Last year's smuggled goods included 40 Microvax IIs, Laszlo told the undercover agent, and he planned to acquire 15 more this year.

"We do understand that some DEC equipment was involved, but we are not involved in any way in the incident," a spokeswoman for DEC said. The DEC equipment was allegedly purchased by Laszlo from a Chicago company that has not been identified by federal sources.

Between September 1986 and April of this year, the defendant and his associate, Peter Druck, solicited price quotations from the Chicago source on Microvax IIs, VAX 8600s, VAX-11/750s, 780s and 785s and the related peripherals and connectivity equipment, the complaint stated. In January, Laszlo ordered $250,000 worth of the equipment from the store.

Undercover special agent Steven Crogan, posing as a future source of equipment, discussed export of the equipment with Laszlo. "Laszlo stated he doesn't like the fact that export licenses are required because everyone then knows he has the goods," the complaint said.

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CDC boosts Cyber mainframes

Upgrade includes performance gains, faster channel speed, new drive

BY JEAN S. BOZMAN
CW STAFF

MINNEAPOLIS — Control Data Corp. said last week it will introduce two major enhancements to its Cyber 180 990E mainframes, including a Fortran compiler that boosts performance by 25%, a faster channel speed of 12M byte/sec. between the mainframe's main memory and a new disk drive, the Model 887.

The enhancements, scheduled to be announced this week by the firm's Computer Systems Division, will significantly boost system throughput, according to Gil Williams, vice-president of computer systems operations for CDC. The new disk drive channel speed has been improved by a factor of four.

Combined with existing support for AT&T Unix System V applications, CDC wants to position its systems for more general-purpose applications such as banking. Until now, CDC's strength has been in scientific and engineering applications and in the university market segment.

Using the new Fortran II compiler and Model 887 disk drive, users can run scalar calculations at 28.2 million instructions per second (MIPS) on the enhanced 990E and at 50.8 MIPS on the enhanced dual-processor 995E. Vector calculations can run at 38.7 MIPS on the 990E and at 69.7 MIPS on the 995E, according to CDC. The company also said that a Cyber 990E running under CDC's NOS/VE operating system can support a virtual memory space of 9 terabytes, about 4,000 times that of the IBM 3090 Model 200.

Willams said that for users with mixed vector and scalar processing requirements, "the Cyber 990E performed 15% to 50% better than the next best general-purpose mainframe with vector capabilities — the IBM 3090 Model 200." CDC did not, however, claim superiority compared with the IBM 3090 Model 600, which has not yet been delivered to end users.

"Fortran II makes the Cyber 990E and the dual-processor Cyber 995E the fastest general-purpose mainframes delivered today for long vector-processing applications," the company said last week.

"For I/O-intensive applications, the 887 disk drive has boosted total runtime performance by a factor of two or three in tests conducted by CDC and prospective customers on the Cyber 990E," Williams added.

In December, CDC plans to give the new Fortran compiler the ability to run explicit vector commands embedded in the source code. CDC claimed that feature is essential for general-purpose computing. Initial copies of the compiler will automatically redirect vector problems embedded in the source code to the 990E's vector-processing elements.

System prices for the 64-bit Cyber machines remain the same, with the 990E priced at $2.35 million for a base configuration with 16M bytes of main memory. The 995E is priced at $3.82 million for a base configuration. The systems and the enhancements are available immediately, CDC said.

One key to the high performance of the 990 package is the Model 887 Superspeed Disk System. The Model 887 uses four writing heads to allow for parallel transfer of several streams of data from main memory. The data is transferred at 12M byte/sec., CDC said, and is then broken into four 3M byte/sec. streams for writing to disk.

The Model 887, a 543M-byte drive, was developed by CDC's own Data Storage Products Division. Packaged with two spindles, it costs $120,000.

The Fortran II compiler, which is compatible with the forthcoming ANSI 8X standard, is available at no extra charge to users of the older Fortran compiler, CDC said.

Microsoft intros strengthen C legs

BY DOUGLAS BARNEY
CW STAFF

BOSTON — Microsoft Corp. last week stepped up its war with Borland International over the computer languages market with the introduction of QuickC and an upgrade to its high-end C compiler.

Microsoft Chairman Bill Gates said he believes the high-end compiler, called Microsoft C Optimizing Compiler Version 5.0, is the first personal computer software to implement IBM's Systems Application Architecture (SAA) interface. C is one of three languages that IBM has announced it will support under SAA. IBM also resells Version 4.0 of Microsoft C.

Microsoft and Borland have been battling fiercely for a share of the low-cost computer language market that was almost single-handedly created by Borland's line of Turbo languages, including the original Turbo Pascal, Basic and C.

With last week's introduction, Microsoft's Quick line now includes Basic and C, and a version of Pascal is being contemplated. "There are markets for other Quick products," said Rob Dickerson, group product marketing manager for Microsoft languages.

Both Turbo C and QuickC sell for $99.95. QuickC will ship in September, Gates said at the product's introduction.

The enhancements to the $450 Microsoft C compiler include a 30% faster compilation time, an improved version of the Codeview debugger and new library functions.

In addition, Microsoft's high-end compiler now includes QuickC to allow developers to prototype applications more quickly, Dickerson said. QuickC compiles five to 10 times faster than Microsoft's high-end C.

The competition with Borland has egged Microsoft on to develop products such as its Quick series, Dickerson said. But Microsoft wants more than a maintenance of market share. "Our goal is to own the languages market," Dickerson said.

Gates said QuickC incorporates several features that Turbo C does not, including a debugger and graphics library. In addition, "They say they're compatible without C 4.0," he said. "They're not."

Borland President Philippe Kahn said Turbo C has superior technology and is not concerned about Microsoft's goal. "It is a little presumptuous of Microsoft to want to own the languages market. That is the problem Microsoft has, they want to have everything," Kahn said.

AST boards for PS/2 allow link to 30 series

ATLANTA — AST Research, Inc. introduced communications boards for the IBM Personal System/2 Models 50 and 60 at Comdex/Spring '87.

The Enhanced 5251/11A and Enhanced 5251/11A Plus boards are said to enable the two PS/2 models to communicate with IBM System/34, 36 and 38 minicomputers by using twinaxial cable.

Priced at $895 and $995, the boards support IBM 5251 Model 11, 5291 or 5292 Model 1 terminal emulation as well as bidirectional file transfer. The Enhanced 5251/11A Plus offers the ability to run up to seven different display and printer sessions concurrently.

Both communications boards feature an on-board Intel Corp. 80186 processor. In addition, each board employs three custom function-specific chips — a high-speed bit-slice communications processor, a twinaxial protocol handler and a custom line driver that is said to provide constant signal levels during long twinaxial runs.

Rather than use microcomputer random-access memory to perform emulation, the boards use 128K bytes of resident memory. The boards also support cluster and gateway processors.

Data manipulation

Bidirectional file transfer software is included with the communications boards, eliminating the rekeying of microcomputer data and enabling the manipulation of data from the minicomputer.

A software-controlled hot key is said to allow users of the boards to toggle between Microsoft Corp. MS-DOS and System/34, 36 and 38 sessions. Password security, Help screens and configuration menus are also featured.

Both products are scheduled to be available in September.

CORRECTIONS

Artificial Technology's AT-System [CW Spotlight, May 25] comes standard with 512K bytes of random-access memory and costs $1,325. Its fully configured, 8088-based XT-Turbo sells for $745.

Honeywell Bull, Inc. will not be an exhibitor at the National Computer Conference 1987 [CW, May 25]. Disc Instruments, a Honeywell, Inc. subsidiary, will be exhibiting at the show with another Honeywell division.

Aion Corp.'s interfaces to IMS/VS and CICS/VS [CW, June 1] are now available.

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Midwest
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IDG News Service
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Main Editorial Office
Box 9171, 375 Cochituate Road
Framingham, MA 01701-9171
617/879-0700

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PC additions lead Focus product blitz

BY CHARLES BABCOCK
CW STAFF

PALM DESERT, Calif. — Information Builders, Inc. staged its largest set of Focus announcements in its 12-year history last week, covering both personal computer, minicomputer and mainframe versions, at this Hollywood-oriented resort outside Palm Springs, Calif.

Information Builders made the product blitz at the annual meeting of the independent users group Focus Users for System Enhancements. The additions reflect Information Builders' attempt to address the frequently conflicting aims of its customer base — to increase the sophistication of Focus programmer tools on the one hand while improving end-user access on the other, said Gerald Cohen, chairman of the New York firm.

Included in the blitz was a new release of PC Focus with features that are said to make it function less like a mainframe product and more like an end-user system. Also unveiled was a window-driven application generator for both PC and mainframe Focus.

With the windowing capability, a program developer can paint a window on a screen to be used as pop-up, pull-down or nested windows in an application. The windows can be modified in size and shape, pulled into new positions on the screen and have different colors given to their attributes, Information Builders officials said.

After the developer has achieved the window combination he wants, PC Focus generates the code needed to add the window to the application, Information Builders spokesmen said.

Designing, modifying data bases

A second major addition to PC Focus is the application generator, Modifytalk, which, through a series of menus and prompts, allows an end user to build applications for updating, changing or deleting data in Focus data bases. Previous Focus tools have concentrated on report writing and manipulating data extracted from the data base but have not provided an ability to design data bases and change their contents, said David Feldstein, vice-president of micro products.

Modifytalk can be used to construct I/O screens and the processing logic that connects them. "If you know how to use the Up arrow, Down arrow and Enter key, you can do 90% of what you can do with Focus command language," Feldstein claimed.

Modifytalk on the mainframe performs the same functions under IBM's MVS/TSO or VM/CMS and is currently available at $450, or $79 per month.

The release includes enhanced graphics that show pie charts in three-dimensions and allow one slice to be exploded out from the scene.

PC Focus Release 3.0 also contains a scripting language that permits the creation of logon procedures that open immediate communications between PCs and mainframes or PCs and Digital Equipment Corp. VAXs. The procedures can be stored and executed with a keystroke, Information Builders spokesmen said.

The new features are accessed through a master menu that controls the PC Focus session. Release 3.0's menu requires placement of a user's cursor. "It is deliberately a high-end product. When you run out of steam on [Ashton-Tate's] Dbase or [Lotus Development Corp.'s] 1-2-3, come to us," Feldstein said.

As a high-end PC product, PC Focus Release 3.0 occupies between 4M and 4.5M bytes of a hard disk and must be loaded from 14 PC diskettes. When running, Release 3.0 will require 540K bytes of a PC's 640K-byte memory and must frequently go to the hard disk for additional system modules, Information Builders spokesmen said.

Release 3.0 is slated to be available in early to mid-August at a price ranging from $795 to $1,295, depending on quantity, spokesmen said.

At the same time the firm announced Release 3.0, Information Builders said it was introducing a natural language query system, EQL. EQL is said to formulate PC Focus queries from English language statements that draw on EQL's limited 500-word lexicon. Users may define additional words in EQL's lexicon and use them in forming queries on files in PC Focus.

EQL is priced between $137 and $249 and is scheduled to be available in July.

In July, Information Builders is scheduled to offer a $107 to $195 interface to Ashton-Tate's Dbase III and Dbase III Plus files. According to Feldstein, the interface allows Dbase files to be used by PC Focus as if they were Focus files.

In addition, Information Builders announced an auditing system, Focaudit, which allows a user to examine data interactively from Focus-accessible files, using tools designed for financial auditors. It will be available to run under VM/CMS and MVS/TSO in the third quarter for $15,000, or a monthly license of $475.

Information Builders also announced Focman, a project management system for DEC's VAX. It will be available for $4,000 on the Microvax and $30,000 on the VAX 8800.

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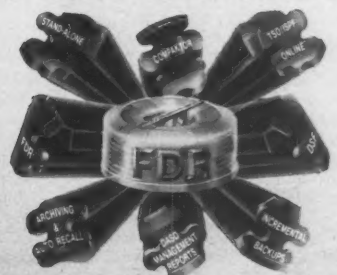

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Wang

FROM PAGE 1

Roon's assessment was confirmed by several sources familiar with the South African computer marketplace, including National Data Computer Society President G. C. Prinsloo and a U.S. government official in Johannesburg who requested anonymity. "Wang is almost synonymous with word processing in this country, and that has not changed," Prinsloo said.

"Wang's position is no different from that of other companies that have withdrawn their direct activities," the U.S. official said. "Wang products and services are still freely available in the market. We deal with one particular authorized Wang dealer on a weekly basis."

Pullout firmly stated

But unlike IBM, Amdahl Corp. and other vendors that have divested their South African subsidiaries but retained them as distributors, Wang has firmly stated that it ceased all distribution to South Africa in 1985, seven years after it sold GBS to GBS employees.

Wang's statement last week confirmed information obtained by *Computerworld* illustrating Southern Star's role as a conduit between Wang and GBS. Southern Star is listed as a distributor on Wang's monthly sales reports of October and November 1986 for its Africa/Middle East operations under Wang Vice-President Han van de Ven.

Southern Star is the only entry on the reports not listed by a country name. But in a computer printout from Wang's order processing department in August 1986, Southern Star carries the same distributor code number, 5030, that is designated for South Africa in a printout from November 1986.

According to the November distributor sales report, Southern Star was the leading distributor of Wang products in the Middle East and Africa in the first 11 months of 1986. Southern Star's bookings of $3.63 million represented 17% of total bookings for the Middle East and Africa, and its 11-month revenue of $2.28 million accounted for 20% of the region's total.

The use of Southern Star as a conduit between Wang's Lowell, Mass., headquarters and GBS is confirmed by an October 1986 telex message from Southern Star and its manager, Carmen Repsold, to a Wang international marketing employee in Lowell.

The telex contains a second message from Bob Batchelor, GBS's national marketing manager, that begins by asking Repsold to forward the message to Lowell.

In the message, Batchelor requests pricing, including "distribution prices," and availability information on several Wang products, including the 2200/VS computer, WP Plus parts, a color graphics terminal and a Wang 512K-byte personal computer announced in September 1986. It also contains the message, "Thanks for the latest focus and price lists."

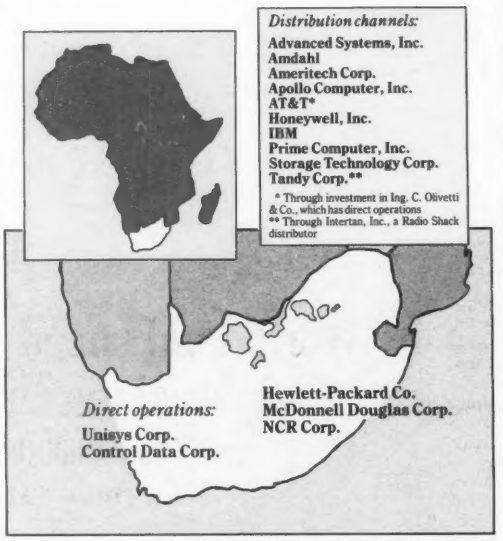
Southern Star is no longer listed in Fort Lauderdale's phone listings. Wang no longer does business with Southern Star.

The Investor Responsibility Research Center, a Washington, D.C.-based nonprofit research group for institutional investors, said it has been frustrated in its correspondence with Wang about the company's South African involvement. "We are unsure of the status of Wang in South Africa," research analyst Alison Cooper said. "We've been attempting to get a clear reading from Wang on the situation."

Wang's confirmation of its South African product distribution last year came the same week as a leading antiapartheid activist's call for all U.S. companies to divest their South African operations within nine months. Philadelphia clergyman Rev. Leon Sullivan, whose Sullivan Principles have become the ethical guideline for most U.S. firms with South African operations, said the 10-year-old principles had failed to end apartheid and that a complete withdrawal of U.S. businesses is needed.

The South African connection

Many computer firms maintain distribution, although they have ceased direct operations



INFORMATION PROVIDED BY COMPUTERWORLD AND INVESTOR RESPONSIBILITY RESEARCH CENTER

CW CHART: MITCHELL J. HAYES

Reports continue of Wang sales to S. Africa

When contacted by *Computerworld*, General Business Systems (GBS), Wang Laboratories, Inc.'s former South African distributor, denied that it still does business with Wang. But in the South African business and trade press, both GBS executives and South African journalists paint a clear picture of a company that continues to depend on sales of Wang computers to fuel its lucrative growth.

In a telephone interview last month, GBS Chairman Martin Hammerschmidt said that GBS's only current Wang business is in a small number of secondhand computers and Wang-compatible peripherals and memory upgrades from other vendors.

He said that press references to GBS's Wang business refer to GBS's support of its Wang installed base that purchased computers before 1985, rather than to sales of new Wang computers.

But this year, in an April 24 GBS profile in South Africa's *Computer Mail* and in a February story in *South African Dealer News*, GBS Marketing Manager Bob Batchelor said that GBS intends to increase its Wang business at 20% per year. Although GBS has introduced its own private-label minicomputers as well as a Taiwan-built microcomputer, the articles clearly indicate that sales of Wang products are still GBS's lifeblood.

The *South African Dealer News* asked Batchelor if GBS's own minicomputers would hurt its Wang sales. "Not at all," Batchelor was quoted as saying.

"Our Wang business will remain very important to us, and we intend growing that market at a rate of 20% per annum for the foreseeable future. . . . We were also determined to find a product complementing and not in any way conflicting with our Wang product range," Batchelor said.

According to *Computer Mail*, GBS has an installed base of 22,000 Wang units at 2,500 customer sites in South Africa. GBS General Manager Jack Dunwoody told the publication that GBS's product-mix goal for the next three years is 40% Wang, 40% GBS minis and 20% micros.

In April 1986, Dunwoody told *Computer Mail*, "We are the Wang people. We believe Wang is the world leader in office automation. . . . We see no reason at all to move away from the products which have taken us from an R2.8 million company to an R44 million company in seven years."

Dunwoody was referring to the South African rand, which equals about 50 cents, making GBS a $22 million business currently. In the fiscal year ended June 1986, GBS reported a pretax profit of about $2.3 million, according to *Computer Mail*.

GBS's Wang business has apparently continued to thrive. Cees Roon, president of South Africa's Computer Users Council, said last week that a major mining company and users council member had just installed a major office automation system "over several floors" that included a large Wang minicomputer sold by GBS.

"I don't know of anyone else supplying Wang equipment in this country," Roon said.

GBS also lists its phone number in Johannesburg under "Wang Computers" as well as under its own name.

CLINTON WILDER

IBM 9335 questions ironed out

BY STANLEY GIBSON
CW STAFF

RYE BROOK, N.Y. — IBM last week sought to resolve conflicting statements it had made — which have caused confusion for a number of users — concerning performance of its 9335 disk drives and controllers.

Although IBM last month referred to an engineering change affecting performance [CW, May 11], IBM last week said there is no change as such, but 9335 users who have slow performance may request "system tuning" that may correct the problem. IBM service engineers have information on how to improve direct-access storage device (DASD) throughput, according to Stephen Schwartz, an IBM vice-president.

Several users of 9335 devices said last week that they had requested information on the engineering change and were told by IBM that there was nothing available.

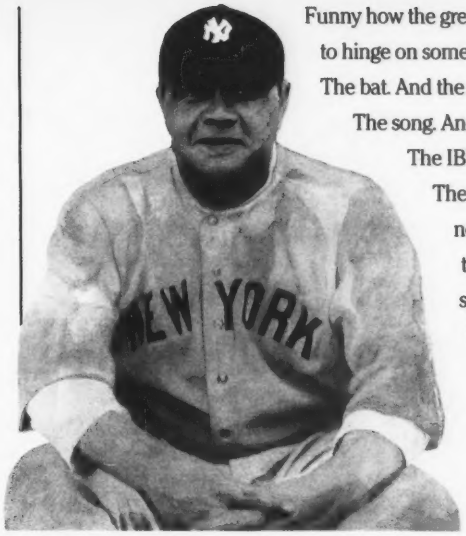
System tuning the answer

Schwartz said less than 10 customers had come forward with requests to improve performance. Some of these users had heavy transmission environments, according to Schwartz. "But we have fixed them all. In every case, system tuning solved the problem," he said.

Several users reported slower than expected performance when three or four drives are attached to a single controller. Schwartz said, however, that 9335 specifications called for slower performance.

IBM acknowledged that the information in the May 11 *Computerworld* story was correct, as provided by IBM at the time. However, IBM corrected its statement that Release 8.2 of the System/38's Control Program Facility operating system was needed for system tuning to improve performance and said only Release 8.0 is required.

Beverly Moultrie, a systems programmer for Trammell Crow Co. in Dallas, said IBM recently put in a change to the microcode of her 9335 controllers that allows the controllers to better support three drives on a string. Schwartz said that an engineering change is now in production that allows 9335 DASDs to work interchangeably with System/38 processors and 9375 minicomputers. He said the engineering change was made several weeks before general availability of the 9370 machines to ease production of the drives.



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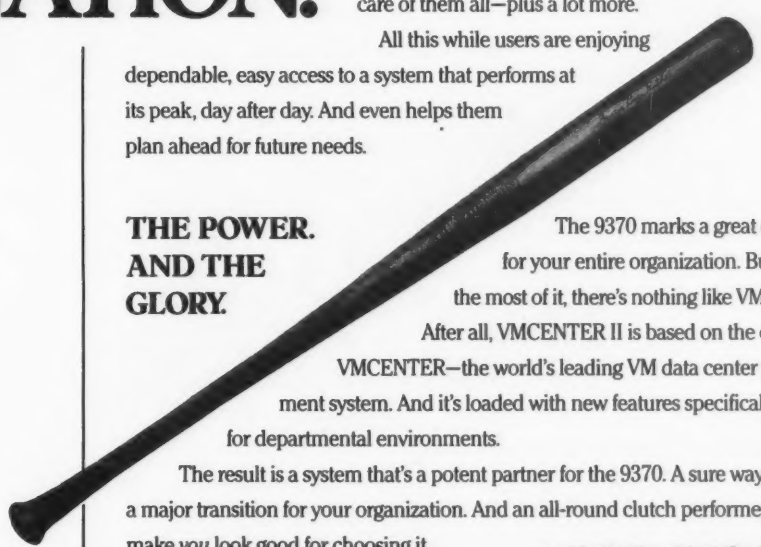

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VMCENTER II FROM VM SOFTWARE, INC.

Users fear an unwieldy, uncertain giant

BY ROSEMARY HAMILTON
CW STAFF

Users raised concerns last week that the marriage of Computer Associates International, Inc. and Uccel Corp. will create a software giant that is too big, with an unwieldy product line that, for now, has an unclear future.

"My reaction is disappointment," said Robert Marsh, supervisor of service-level management at Dow Corning Corp. in Midland, Mich. "It's an all-in-one nest of software to too large a degree. It would be healthier for us to have about a half-dozen vendors with moderate market shares."

A wealth of sites are currently using system software from both vendors, that, until last week, were fierce competitors in that market. Many users contacted by *Computerworld* last week said they have good working relationships with both vendors. But users said a new combined entity with overlapping products in about six key areas raises questions of future products and support.

"We were not at all expecting this," said Douglas Arnold, senior vice-president of data processing at the Continental Bank in Fort Washington, Pa. "So now, we wonder if our projects will sit still while they coordinate the new organization. In our mind right now is the question of which of their products are going to be the surviving ones."

Product support

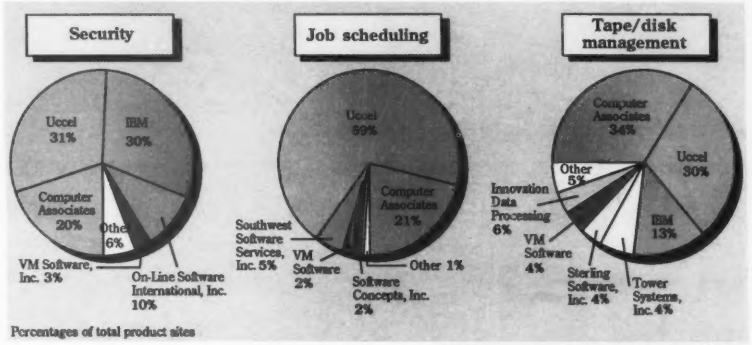
Executives from both vendor companies said last week they will continue to support all existing products. Industry analysts, however, said they expect Computer Associates to scale back. "They've stated that they'll support all the products, but clearly they will consolidate them over time. That's what Computer Associates has always done," said Kenneth Burke, a vice-president of research at Alex Brown & Sons, Inc.

"I should think the users would feel a tremendous comfort," said Charles Wang, chairman of Computer Associates. "Our history is to support redundant products, and it won't be reluctant support. We've never done an ADC2 fiasco like Uccel."

Earlier this year, Uccel told users it would discontinue the ADC2 scheduling package it had acquired from The Cambridge Systems Group, Inc. in late 1986. It later reversed its position when users strongly criticized the vendor's decision and the product's developers filed a breach-of-contract suit.

One user said he fears the new Computer Associates could hinder a user's ability to get the best possible product. "This deal limits the competition, and that's not good," said William Smith, production services manager at The Boston Co. in Boston. "If they have the best two scheduling packages on the market, then they can afford to relax a bit," Smith said. "They can afford to because they have the market locked up. When there's competition, the vendors tend to do a better job."

Computer Associates stands to gain lion's share of top markets



INFORMATION PROVIDED BY COMPUTER INTELLIGENCE
CW CHART: SUSAN ALDAM

Merger

FROM PAGE 1

advantages — outside of price control — that Computer Associates would gain from the deal.

There is about a 20% overlap in competing systems software products, both firms conceded. But according to International Data Corp. (IDC), a Framingham, Mass.-based market research firm, the overlapped products account for about 50% of Uccel's revenue. Both companies compete in the DOS/MVS conversion software arena — disk and tape management, print management, production control and direct-access storage device management.

"The most overlap comes in areas where both companies have the greatest installed base," noted Peter Burris, an IDC analyst.

"The overlap is not a concern; we have experience in that area," Wang countered.

Timing a puzzle

Also puzzling was the timing of the deal, since both companies recently finished digesting a flurry of acquisitions. Computer Associates acquired Software International Corp., from General Electric Co., and Integrated Software Systems Corp. last year in deals with a combined value of roughly $100 million.

Uccel, under chairman Gregory Liemandt, has spent the last several years divesting itself of unprofitable business lines and has acquired a number of software companies, including The Cambridge Systems Group, Inc. and California Software, Inc. Uccel purchased seven companies in 1986.

Wang said the combined companies would continue to support and enhance both firms' product lines. He said the plan is to create one "superset" product line for both firms' customers.

However, IDC's Burris said Computer Associates would face a steep challenge in developing an all-encompassing systems software product line for both sets of customers.

Computer Associates' *Wang (left) with Uccel's Liemandt*

If completed, the acquisition could give Computer Associates some leverage to reverse downward pricing pressure in the systems software business, some analysts said. "By eliminating your major competetion, it has to relieve some of the pressure on prices," noted Scott Smith, an analyst with Donaldson, Lufkin & Jenrette, Inc. in New York.

Wang said the firm has no plans to change prices.

Under the terms of the agreement, Uccel shareholders would receive the equivalent of $47.50 a share in Computer Associates stock, a value that equated to almost a 50% premium at the time of the offer on June 1. In addition, Uccel's largest shareholder, Walter Haefner, a reclusive Swiss investor who holds 58% of the firm's stock, would gain approximately 25% of Computer Associates. Charles Wang and his brother, company President Anthony Wang, currently own approximately 14% of Computer Associates' shares.

Liemandt, who will leave the company if the deal is completed, said the acquisition combines what he called two of the most attractive companies in the software industry. The deal, he added, "enhances" his four-year effort of focusing Uccel's efforts on systems software and applications for the financial industry.

"When a company is willing to pay a price to get you and is willing to let you participate in the strategy to get things going — in a shared transaction — why not do it?" Liemandt asked.

Wang said it has not been decided how many of the firms' combined 4,000 employees would be let go. "Our past policy has been to eliminate redundancies," Wang said. "We will identify the reductions as close to closing the deal as we can so we leave no one hanging.'"

Observers last week questioned whether the combined companies would alter the competitive environment of the independent software industry. The deal, some analysts said, might compel small software firms to merge to obtain the resources to compete.

Other industry players said they see little change in the offing, except for a gradual upswing in prices.

"I don't think this will have a major impact on the software industry," said Jack Berdy, chairman of On-Line Software International, Inc. in Fort Lee, N.J. "I see one plus for us. When Computer Associates competes, they've always done so on price, not on technology. The fact that they no longer have to do it means they have to go out and raise prices."

The proposed acquisition is subject to shareholder and regulatory approval. Wang said he did not envision any problem with the approvals.

Despite the size of the proposed acquisition of Uccel, Computer Associates said it expects to continue to use acquisitions to fuel its growth, which has ranged from 35% to 60% annually during the last few years.

Bank unit's future hazy

BY ROSEMARY HAMILTON
CW STAFF

The fate of Uccel Corp.'s financial software division was plunged into uncertainty last week when Computer Associates International, Inc. announced plans to acquire the Dallas firm.

Industry observers speculated that Computer Associates could eventually scrap the division, while users said they were optmistic that business would go on as usual. Meanwhile, executives from both companies were unable to provide a clear direction for Uccel's banking software arm.

"I think they're not going to say anything now to disturb the banking customer base," said Stephen McClellan, a vice-president at Merrill Lynch & Co. in New York. "But after the deal closes, I think there's a fair chance that they may end up divesting of it. I don't think in the long term they'll hang on to it."

Representing $30 million of Uccel's $141.6 million in revenue last year, the financial systems division is not the focal point of the proposed acquisition, observers said. It also functions as Uccel's only separate entity from its systems software business, which observers said is the main purpose of the estimat-

Continued on page 10

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TCP/IP-to-TSO software links readied

Mitek tools offer file transfer between standard protocol within SNA in mainframe world

BY DONNA RAIMONDI
CW STAFF

CARROLLTON, Texas — Software that allows communication between IBM 3270 TSO users and computers connected to a Transmission Control Protocol/Internet Protocol (TCP/IP) network is scheduled to be unveiled next week by Mitek Systems Corp.

The two products are targeted at the "departmental world that wants to connect to the IBM backbone that's on the business side of the corporation," regardless of whether the departmental systems are Unix-based, IBM Personal Computers, Digital Equipment Corp. VAXs or anything else on a TCP/IP network, Mitek spokesman Tim Hogan said.

The Telnet Server package is said to let any TCP/IP Telnet device on the TCP/IP network, including terminal servers, emulate a Systems Network Architecture (SNA) 3270 connected to an IBM host. The package resides on the Mitek controller hardware that is attached to the IBM host. Thus, the Telnet devices have the same access to the IBM mainframe as do 3270 users, Mitek said. The server is compatible with all IBM MVS, VM or PC-DOS VSE systems that support VTAM.

The Telnet/File Transfer Protocol (FTP) Client, resident on the IBM host running TSO, is said to allow 3270 workstations to communicate with users of a TCP/IP network and to transfer files to and from systems on TCP/IP local-area networks (LAN). The 3270 user reportedly also has access to other Mitek-connected networks.

"TCP/IP is often associated with Unix running on Ethernet," said communications analyst Alice Bradie of Hambrecht & Quist, Inc. Mitek's tool permits file transfer using the established industry standard TCP/IP within the context of IBM's SNA in the IBM mainframe world.

Ethernet LANs located close to the mainframe may be channel-attached, and remote TCP/IP networks can be link-attached, the company said.

The two software products can be purchased individually or together. Telnet Server for Mitek's M2X30 SNA Network Server hardware costs $5,000; the TSO Telnet/FTP Client package for MVS costs $8,000.

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Future hazy

CONTINUED FROM PAGE 8

ed $800 million acquisition. Uccel and Computer Associates have long been fierce competitors in the systems software area.

"The real synergy of this deal is on the systems side," said Donald Steele, a Uccel vice-president and general manager of the financial software division. "For that area, it's a wonderful deal."

Such uncertainty comes at a critical time for Uccel's banking division, which is facing its first major product delivery challenge since it entered this market in the early 1970s. It missed its second-quarter delivery date for a highly complex integrated loans package and reportedly plans to announce a new delivery date this week. About 40 customers who ordered Infoloans last year have had to adjust their plans because of Uccel's delay.

Further delays or changes to Infoloans could hinder Uccel's standing in the market. To date, it is one of the few banking software vendors that has remained on a steady growth path and avoided product introduction disasters like those of Hogan Systems, Inc. and Anacomp, Inc.

Steele said the company intends to continue with its scheduled plans for Infoloans. "They can't make decisions for us over the next two months, and they agreed with our position, our way of handling Infoloans," he said. "We will be announcing a delivery date by midweek, as we've been planning."

Charles Wang, chairman of Computer Associates, said in a *Computerworld* interview that he is "not the one to say, 'Let's change Infoloans.'" However, Wang also said Computer Associates plans "to make our technology available to the project."

"It's no secret that this project has been in trouble," said Osmman Eralp, senior technology analyst at Hambrecht & Quist, Inc. "They have obligations to customers, but Computer Associates will be taking a hard look at the future profitability of that division. Computer Associates is very opportunistic. They have no love for, or fear of, the banking industry; they'll get out of banking if close analysis shows Uccel isn't going to stay very competitive in this market."

Some industry observers suggested that Computer Associates may have its eye more on the 850 customers that Uccel's banking division would provide for its own system software products than on pushing a line of banking software.

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MI Detroit ... Apr 7, May 12, Jun 9
Grand Rapids ... Apr 9
MN Minneapolis ... Apr 23, May 13, Jun 30
MO Kansas City ... Apr 9, Jun 9
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NE Omaha ... Jun 2
NJ Iselin ... Apr 1, Apr 15, Apr 29, May 13, May 19, Jun 11, Jun 25
NM Albuquerque ... Apr 30
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NY Albany ... Apr 23, Jun 17
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New York City ... Apr 8, Apr 16, Apr 22, May 6, May 14, May 21, Jun 16, Jun 24
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OH Cincinnati ... Apr 22, Jun 17
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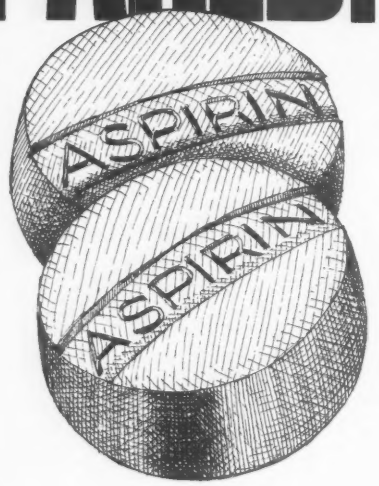

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Sun brightens networking strategy

Plans faster mainframe links, tool tying Macintosh to supercomputers

BY NINAMARY BUBA MAGINNIS
CW STAFF

MOUNTAIN VIEW, Calif. — Sun Microsystems, Inc. unveiled networking products last week that strengthen its workstation connectivity strategy by providing faster links to IBM mainframes.

The vendor also revealed development plans that will combine its Network File System (NFS) and TOPS, translation software supplied by Centram Systems West, Inc., the vendor's newly acquired Berkeley, Calif.-based subsidiary. The new product will create a link between Apple Computer, Inc. Macintosh computers and personal computers to supercomputers, the vendor said.

In addition, Sun announced its Open Systems Network, a commitment to pave the way for networking computing where all connected systems work together as one large resource.

Networking tools shipped

The vendor also began shipping Open Network Computing, a set of existing networking tools that will reportedly enable users of different computer systems running different operating systems to access data from any system on the network, the vendor said.

Additions to the Sunlink family of products include Channel Adapter, Local 3270, Systems Network Architecture (SNA) Peer-to-Peer and Multiprotocol Communication Processor.

The Sunlink data communications products provide wide-area networking solutions, links to IBM and Digital Equipment Corp. VAX systems and a smooth migration path to Open Systems Interconnect, according to Sun.

The Channel Adapter consists of two VME boards that use standard IBM channel protocols to communicate with the host and require no special software on IBM systems, Sun claimed.

The Sunlink Local 3270 software runs over the Channel Adapter and enables emulation of a locally attached IBM 3274 cluster controller.

LU6.2 communications

Sunlink SNA Peer-to-Peer allows Sun systems users to communicate with IBM's LU6.2 protocol, also known as Advanced Program-to-Program Communication, and IBM's Document Interchange Architecture command-function sets.

The Sunlink Multiprotocol Communication Processor board can support both synchronous and asynchronous communications and allows Sun systems to link to multiple devices and run several protocols concurrently.

Sunlink products are scheduled to be shipped in August. The Channel Adapter costs $20,000, and the Local 3270 lists at $6,000. The SNA Peer-to-Peer is priced at $6,000, and the Multiprotocol Communication Protocol costs $4,000.

Sun's NFS licensees are now receiving Open Network Computing networking products that have been previously bundled only with Sun workstations, the vendor said. The repackaging of Open Network Computing products will enable other vendors to distribute them with their own machines.

Open Network Computing tools and services include NFS, Diskless NFS, the Remote Procedure Call, Remote Execution Service, Lock Manager, Yellow Pages and the Remote Procedure Call Protocol Compiler, Sun said.

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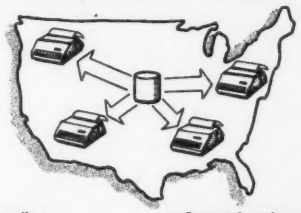

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AT&T offers backup for PBX

BY ELISABETH HORWITT
CW STAFF

MORRISTOWN, N.J. — Targeting customers for whom fail-safe telecommunications is a high priority, AT&T last week announced a new model of its System 85 digital private branch exchange (PBX) system line that will come equipped with a back-up processor.

The System 85 SE's backup processor automatically takes over call processing when the primary unit fails, AT&T said. The model includes all voice and data features available on standard System 85 models with Release 2, Version 3 software, such as automatic route selection.

However, the SE lacks certain features that would permit it to perform as a full member of an AT&T Electronic Tandem Network (ETN) of multiple PBXs, according to AT&T spokeswoman Ruthlyn Newell. "AT&T cut back on the SE's private networking features since the target market is medium-size, single PBX locations such as a hospital or government customer," she added.

The SE lacks AT&T's Distributed Communications Systems software, which provides full-feature transparency among multiple PBXs in a private network. Also, the SE cannot act as a full ETN node that both accepts and passes on transmissions to other systems, Newell said.

By eliminating these features from the System 85 SE, AT&T was able to price the system at between 10% and 15% less than a comparable System 85 with full private-networking features, according to Newell. Available immediately, the system is designed to handle between 200 and 800 lines.

Unisys creates banking application

SAN FRANCISCO — Unisys Corp. announced last week that it had used its own Linc fourth-generation language to write an international banking application for use on A series mainframes.

The new banking product, called Global Wholesale Banking (GWB)-Linc, is designed to make electronic reports of international banking transactions. Unisys claimed that by using Linc, programmers were able to write the GWB code up to 10 times faster than they could have through conventional methods.

GWB, announced at the American Bankers Association conference here, is one effort that Unisys is making to leverage Burroughs Corp.'s traditional strength in banking into a new market share for Unisys. The company already had a strong presence in international banking from its installed base of Swift international banking network users.

"Unisys has hundreds of customers in international banks and financial service institutions," said Mark Roberson, vice-president and program general manager of Unisys' Detroit-based Financial Systems Division. "Coupled with the global commitment and support that Unisys provides its customers, GWB-Linc is a strategic product we expect will expand that base."

Users can combine customer-defined data files with GWB modules that handle specific banking tasks. These modules handle such activities as foreign-exchange trading, money-market trading, commercial lending and general ledger accounting, Unisys said. GWB-Linc packages are priced at $207,000 to $450,000, depending on the user's A series configuration. It is set to ship this summer.

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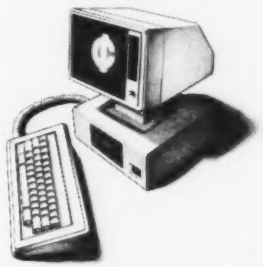

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Compaq adds disk caching to PC line

BY ALAN J. RYAN
CW STAFF

HOUSTON — Disk caching has been added to enhance the performance of fixed-disk models of Compaq Computer Corp.'s desktop and portable personal computers, and prices have been reduced for two of the company's portable models, Compaq said last week.

The disk caching will be a standard feature on the Intel Corp. 80286-based Compaq Deskpro 286, Compaq Portable III, Compaq Portable II and the Intel 8086-based Compaq Deskpro.

"Having this software utility as a standard capability will help end users get more out of our PCs," a Compaq spokesman said.

Disk caching can provide performance improvements of up to 50% in applications requiring frequent fixed disk drive access such as data base and accounting programs and has been a feature on the Deskpro 386 since early last month, Compaq said.

Disk caching works with Compaq base memory up to 640K bytes and extended memory above 640K bytes, as well as with expanded memory capabilities provided by various third-party manufacturers that meet the Lotus/Intel/Microsoft Expanded Memory Specification.

Compaq said the unit price reductions are now in effect for the Compaq Portable II, Models 2 and 4. Suggested resale price of the 80286-based Compaq Portable II Model 2 has been reduced from $2,999 to $2,699, and the price of the Model 4 has been cut from $4,499 to $3,999.

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Computerland chain sold

BY ALAN J. RYAN
CW STAFF

OAKLAND, Calif. — A New York-based investment group will likely be the major shareholder of Computerland Corp. within 90 days.

Computerland announced last week that the group, led by E. M. Warburg, Pincus & Co., a large venture banking firm, has agreed to acquire its business. Eighty percent of the mammoth personal computer retail chain will reportedly be purchased by the financial services firm. Terms were not disclosed, but analysts estimate the value of the deal is in the neighborhood of $200 million to $250 million.

The Computerland spokeswoman said there will probably not be any management changes following the acquisition, and that the company's name will not change.

Computerland reported annual network retail sales of $1.45 billion in 1986.

Last year, company founder William H. Millard said he was seeking a buyer for the firm, and sources said the asking price was approximately $400 million.

Millard, the 800-store chain's principal shareholder and former chairman and chief executive officer, currently controls 96% of the company; the remaining 4% is held by private investors.

Wall Street analysts last week said the Warburg firm is rumored to be considering taking Computerland public within two years.

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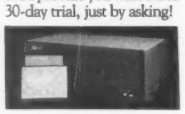

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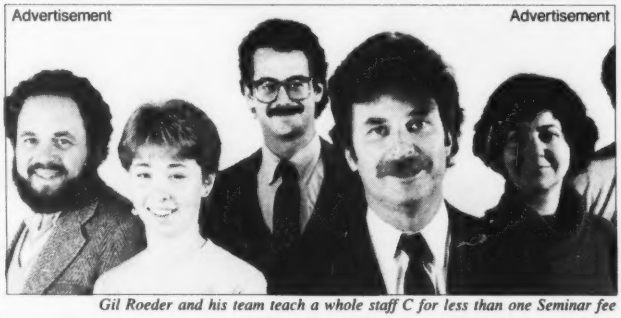

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The Secret: Roeder and his company have helped thousands to master computers and software. The secret of their system is its focus on people: using human experience to teach technical concepts. "It's like learning by osmosis" says one student, "I had no idea I was getting so much. When the tapes ended, I just started programming."

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Banks' paper shuffling gives way to automation

BY JEFFRY BEELER
CW STAFF

SAN FRANCISCO — Having already applied information technology to their back-office functions, U.S. banks are now broadening the scope of their automation efforts with an eye toward improving the effectiveness of their "platform" personnel.

The banking industry's growing emphasis on automating its sales and support functions was clearly reflected last week in a technology-oriented trade show sponsored by the American Bankers Association (ABA). Although the 25th annual National Operations and Automation Conference (NOAC) addressed a wide assortment of high-tech concerns, none generated as much interest among attendees as platform automation, Irving Trust Co.'s Executive Vice-President Donald Monks said.

In banking jargon, "platform" refers to the floor space that most financial institutions set aside for opening accounts, taking loan applications and otherwise transacting business with new customers. In the past, whenever platform personnel completed a form or dispensed information in connection with selling a financial product or service, they did so by means of paper. Today, the manual way of collecting or presenting such data is slowly giving way to intelligent workstations.

Popular topic

Anticipating the high level of interest, NOAC's organizers made the issue the main topic of discussion in one of their opening program sessions. The session, presented by York, Pa.-based independent consultant Cathy Stouch, drew a turnout that was much larger than expected.

It is no accident that banks have waited until only recently to begin embracing platform automation, Monks said. "The process that banks have followed in automating their functions has had to be sequential. Most of the services that are performed out in the platforms depend on data that resides in the back offices," he said. And that is where financial institutions have thus far concentrated the bulk of their automation. Lately, though, the focus of their efforts has shifted.

North Carolina National Bank (NCNB), headquartered in Charlotte, N.C., provides a case in point. Roughly two years ago, when it swallowed what is now known as Bankers Trust of South Carolina, based in Columbia, NCNB rejected the idea of equipping its acquisition's branch offices with a large number of teller terminals. Instead, the bank devoted its energies to automating Bankers Trust's platforms, NCNB Senior Vice-President Harrison Giles said.

The payoff from such an investment in high technology "really has two parts to it," Giles said in an interview at the conference. "One is that it helps to reduce your costs by making the people in your platforms more efficient." Through automation, for example, banks can now hasten the process of completing an application for a certificate of deposit — a task that hitherto involved the manual processing and transfer of a lot of paper.

The other benefit of having automated sales support is that it allows financial institutions to create new products or enter previously inaccessible markets and thus expand their opportunities to make money, Giles said.

Platform automation also dominated last year's conference. At that show, Stouch said, banks typically equated the phenomenon with controller-based, rather than personal computer-based, systems and with just one kind of application: the opening of new accounts.

At this year's conference, in contrast, "bankers are looking at platform automation more as a broad range on integrated applications that include consumer lending and word processing as well as new accounts," she said.

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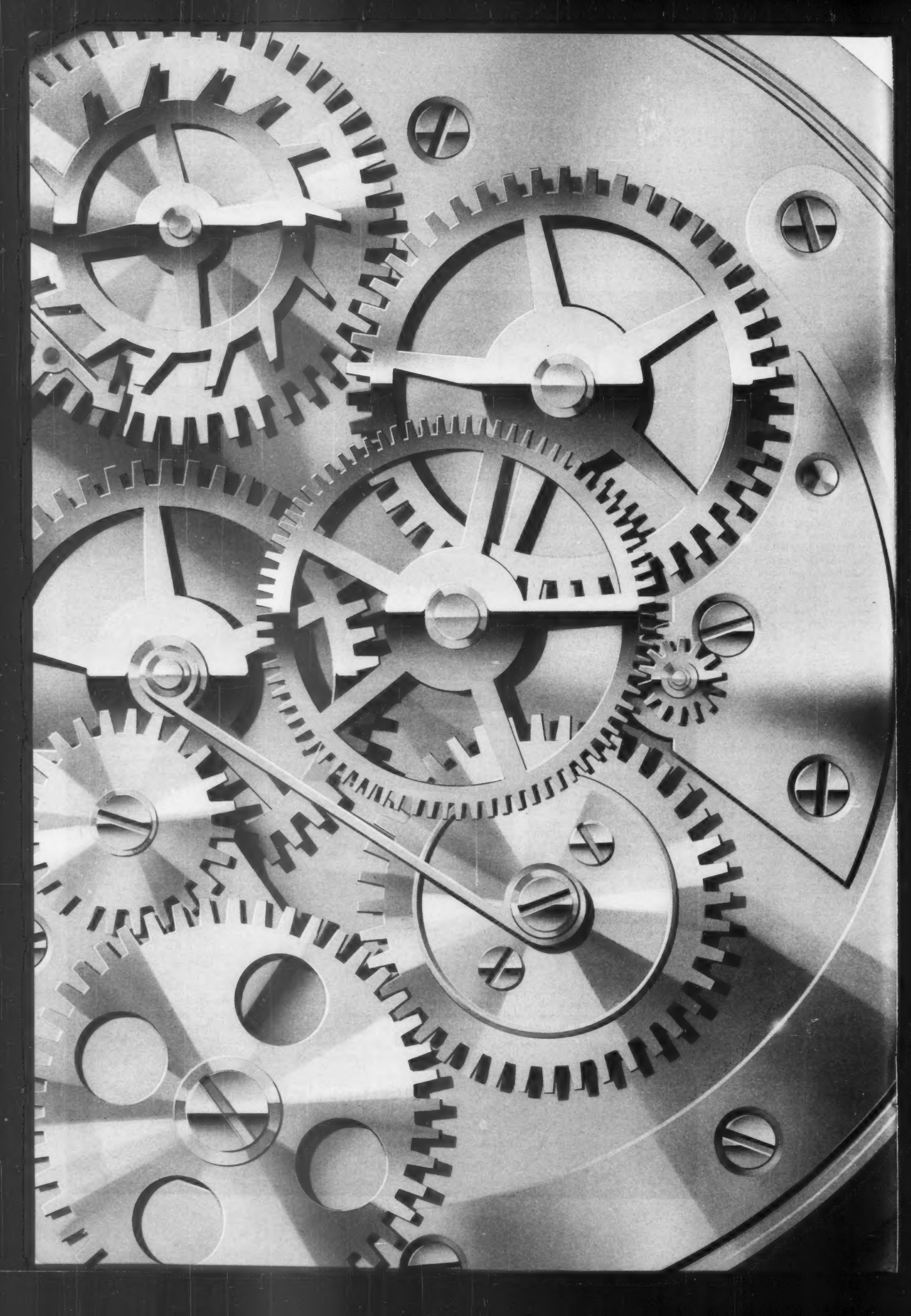

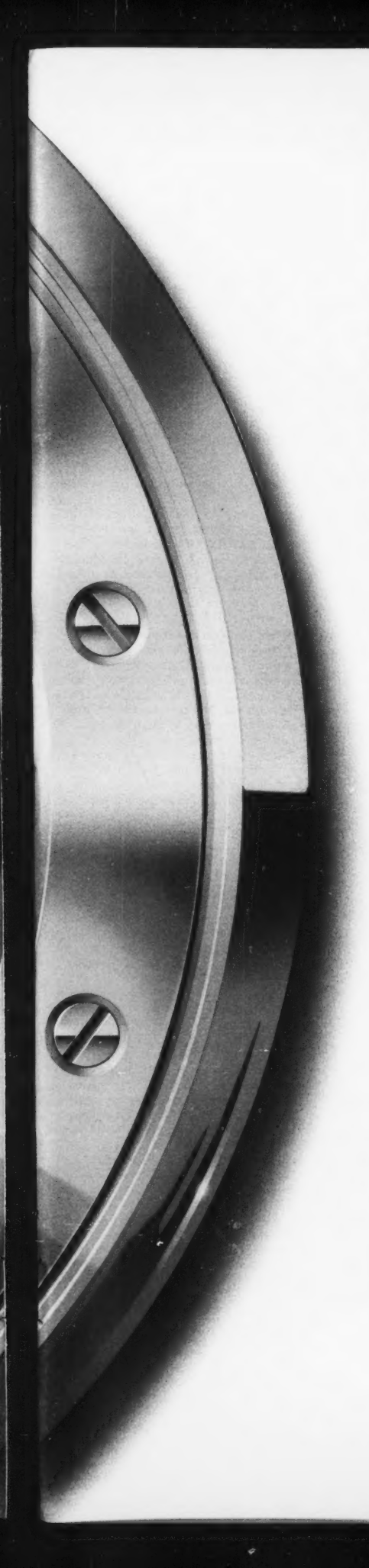

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DG joins PCs to corporate networks

BY ALAN ALPER
CW STAFF

NEW YORK — Data General Corp. last week introduced a series of networking products offering a variety of connectivity choices that integrate IBM Personal Computers and compatibles into an organization's corporate information network.

At the kickoff of its In Concert product exposition held here for customers, the Westboro, Mass., firm also unveiled an electronic mail and document exchange connection between its own CEO office automation system and IBM's Professional Office System (Profs).

DG also disclosed that it has established a unit within its communications systems group to help customers plan, design, install and maintain multivendor computer networks.

The centerpiece of DG's networking strategy is its line of MV minicomputers. The firm reportedly is positioning the system as a network server between PCs on the work group level and the corporate data base residing on the mainframe.

The new networking products enable the mini to act as a gateway to a wide-area network or allow PCs to access data via public or private networks.

Personal Computer Integration (PCI) is a set of hardware and software products based on three components: a network, a communications software platform and a variety of cooperative applications. The products adhere to the Open Systems Interconnect (OSI) model and support IBM's Systems Network Architecture.

Under PCI, customers can link PCs using any one of three local-area networks (LAN): Thin Ethernet, Ethernet or AT&T's Starlan.

Choice of LAN depends on the number of users supported and a customer's preexisting wiring scheme and organizational layout, DG said.

"This approach distinguishes us from some of our competitors, like Digital Equipment Corp., which offers a choice of either Decnet or Decnet," said J. David Lyons, DG's vice-president of group marketing. "We're offering freedom of choice."

The software platform consists of two products to facilitate integration between the PC and the departmental server. Workstation Transport System (WTS), which is compatible with OSI and IBM's Netbios, allows networked PCs to communicate with systems and applications from vendors whose products comply with these standards.

DG is using Microsoft Corp.'s MS-Net to allow an MV system to act as a print or file server for any workstation on the network.

By using MS-Net and Netbios, PC users on the network can run most network-ready Microsoft MS-DOS applications, including DG's own CEOwrite. In addition, MS-Net offers capabilities such as virtual disk and print services and file and record locking.

Work divided in network

PCI allows users to divide work in a network by assigning certain jobs, such as word processing, to PCs and more compute-intensive tasks to larger departmental systems. All users on the network would have access to all computing resources, regardless of where they reside.

Prices for the networking products range from $150 for a WTS or MS-Net redirector license to $650 for DG's implementation of Starlan including a WTS license.

A license for an MV server for MS-Net ranges from $120 to $1,900, depending on CPU size. All products are available 90 days after receipt of order, DG said.

CEO PXA, which provides electronic mail and document exchanges between CEO and Profs, can be licensed for between $5,250 for the MV/2000 and $10,500 for the MV/20000. It, too, is said to be available 90 days after receipt of order.

Late to market

Analysts generally praised DG's networking strategy for its flexibility and inclusiveness, some noted that the firm is late in delivering its solution to the market.

"In concept, this is right on," noted George Colony, president of Forrester Research, Inc., a Cambridge, Mass., market research firm. Colony said DG will not reap the benefits of its flexible networking approach for 18 to 24 months. "It took DEC a while to build its profile as a communications vendor. DG will not be able to do it overnight," he said.

Rudolf Strobel, a consultant with Arthur D. Little, Inc. in Cambridge, Mass., expressed concern that DG's networking strategy, as disclosed last week, does not address the expected explosion of Intel Corp. 80386-based workstations functioning as file servers in personal computer networks.

Such a development, he said, could render the MV network server approach a proprietary solution.

"I have to give them a check mark for well done, but I question what they are doing two years down the road. They have to have something in the works right now," he said.

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EDITORIAL

After the money

Computer Associates International, Inc.'s swallowing of Uccel Corp. — to the tune of almost $800 million — underscores some of the most compelling issues that the vendor community and its customers face. When you consider the lightning speed with which Computer Associates has risen to the top of the independent software heap, it is clear these issues must be met head-on or, in the case of customers, dealt with proactively.

The greatest issue is the pronounced, ongoing consolidation in the software industry. Computer Associates isn't the only one on an acquisitions binge. Uccel has acquired quite a few small companies in the last two years, as have Cullinet Software, Inc. and Sterling Software, Inc.

For companies acquired by cash-rich, bottom-line-oriented megafirms, the most immediate effect is that senior management is often jettisoned. Computer Associates dismissed about 20% of Software International Corp.'s work force quickly after that takeover. Uccel Chairman Gregory Liemandt has already announced he will leave the company after Computer Associates' acquisition, $27.5 million richer.

On the other hand, the acquired companies can find themselves in a much better financial environment to promote existing products and expand product lines with greater research and development outlays. This has long-term benefits both to the vendor and its customers. Furthermore, smaller privately held software companies are more likely to redouble efforts to build successful companies, spurred by the lure of acquisition at a whopping cost. That's good for customers, who benefit from greater attention to customer satisfaction, at least until the sellout.

But are the customers winners or losers in the consolidation game?

In many respects, greater size is comforting. IBM, by virtue of being the world's largest software vendor, is able to commit greater R&D expenditures and a larger sales and service force to its customers. On the flip side, users must be aware that larger companies may find it easier to eliminate or shelve products with a small customer base, that customers may no longer have easy access to top company management and that larger companies are often not as oriented toward innovation and experimentation as smaller companies. For customers of companies that are acquired by software megafirms, active participation in users groups is essential. When Uccel recently decided to eliminate ADC2, a product it acquired from The Cambridge Systems Group, Inc., users quickly and publicly aired their grievance and won a reprieve. A vocal group can have an impact.

Companies that grow large through acquisition will face many bottom-line decisions. Users who have invested in such companies should position themselves to ensure that the vendor looks beyond this year's bottom line and gives full consideration to the potential long-term negative impact that can result from product elimination decisions.

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LETTERS TO THE EDITOR

Academia not rosy

While in agreement with the general picture presented in Rose Mula's Employment Today article, "Choosing freedom over salary" [CW, April 27], I strongly feel that the story is sanitized and glossed over and does not caution the prospective job-seeker on the pitfalls and problems of academic appointments in computer-related disciplines.

While it is true that a doctorate is required in many cases, a Ph.D. may not be adequate in certain cases, such as management information systems departments in business schools seeking accreditation.

Advertisements may encourage an industry background as an incentive, but the real truth may be otherwise. While freedom may be welcome on some campuses that are well-endowed and equipped to encourage unfettered research by eager scientists, it may not be applicable to several other campuses where one will not be paid even for attending a professional group's national conference.

A computer science discipline, more oriented toward technical aspects of electronic technology, should be distinguished from an information systems discipline (or whatever other title it is given), which is oriented toward business and nontechnical users and decision makers.

While there are several Ph.D.s offered under the computer science umbrella, only one campus is listed as offering a doctorate in information systems, according to an index of majors published in 1985.

The tenured faculty who have entrenched themselves for long years without adequate background in the emerging and advancing electronic trends may rightfully, to an extent, deter the entry of a new employee who has a nontraditional industrial background.

With long experience here and abroad in industry, I joined an Ivy League campus in the systems area and received a masters degree in business administration and a doctorate. But I made the mistake of joining the business faculty instead of capitalizing on my MBA. As a result, one has to contend with faceless personnel panels and review committees, working without procedures in most cases, and hope for the best for reappointment and tenure in one's career.

So, while one can say, "I did not promise you a rose garden," my sincere recommendation to an entrant to an academic field would be analogous to my quip regarding vendor selection to my students of systems analysis:

"How do you approach the problem? . . . Very carefully."

N. Nagarajan
East Northport, N.Y.

Security prudent

Many people claim that management refuses to do anything substantive about information systems security until their firm suffers a considerable loss.

This dangerous perspective often becomes a self-fulfilling prophecy. For example, some use this claim as an excuse for lack of progress in the systems security area. Others lull themselves into complacency and passivity by believing that they cannot move ahead with needed systems security efforts until their management directly feels the effects of a major loss.

Granted, selling information security to management is much like selling life insurance. Too many people hope that their vulnerable systems will be spared from material losses, just as many hope they will not die when they are in a position of responsibility. Unfortunately, hoping does not affect the security of the many grossly vulnerable systems now in operation. Therefore, we must be proactive by taking remedial steps to prevent and mitigate future losses. We should declare as passe and counterproductive the idea that a gigantic loss is needed to get management support.

The truth is that most managers are concerned about information systems security, and they need guidance. They are willing to learn from the mistakes and misfortunes of other organizations. Furthermore,

Continued on page 24

This week in history

June 6, 1977
A patent is granted to a pair of Bell Telephone Laboratory staffers for a computer that synthesizes speech. The machine is said to speak as fast or faster than a human being and will, for example, enable computers to speak to people over the phone instead of using a telephone operator.

June 7, 1982
A former IBM employee drives his car through two sets of glass doors into the first floor lobby of the company's Federal Systems Division in Bethesda, Md. Armed with two rifles, a shotgun and a pistol, he jumps from the auto and goes on a shooting spree that kills two employees and injures eight others before he is subdued.

Whether 'tis nobler to benefit mankind

HARVEY NEWQUIST

Not three months ago, I wrote a column here on the progress of Japan's Fifth Generation Project, and now the Japanese come out and announce they are already preparing for the Sixth Generation Project!

Unlike the Fifth Generation, which is geared toward giving Japan world domination in high technology, the Sixth Generation is designed to make sure that we make it alive and well into the next century. As evidence of this altruistic intent, Japan calls the project the "Human Frontier Science Program."

The announcement from the Tokyo-based Council for Science and Technology, a branch of the Ministry of International Trade and Industry, which conducts feasibility studies, said: "Japan must contribute to the world through basic research, playing a role commensurate with its international status and with its level of advancement in the field of science and technology."

> JAPAN wants to make sure its technological undertaking is not misunderstood, like the Fifth Generation was.

There is something very strange about this project. I admit that I'm usually skeptical of these things anyway, but something in this one sets off buzzers, flashing lights, warning signals, sirens and one or two fire alarms.

First off, the aim of the Sixth Generation is to create useful technologies by studying the adaptive behaviors and environments of living creatures and to employ these technologies in creating nonpoisonous, nonhazardous, nontoxic, nonpolluting forms of energy and material. Examples include the conversion of carbon dioxide to oxygen in plant photosynthesis and the decay of organic material into nutrient fertilizer.

This effort fits very nicely into the ultimate goal, which is to take the alienation out of technology by making it an integral part of the human environment. A noble goal, to be sure. That is why Japan is inviting the rest of the world to take part.

That's understandable, you say — the project has worldwide impact. But if that is the case, then why was the Fifth Generation project off-limits to any and all comers until last year? And how come the entire first phase of the Sixth Generation carries a budget from Japan of only $1 million? Seriously now, $1 million wouldn't even pay for a year's worth of postage for any single major Japanese corporation.

Warm feelings

The project is being led by Japan's Prime Minister Yasuhiro Nakasone, who isn't exactly known for his open and warm feelings toward foreign trade, competition or import and export quotas. He says that this time around, though, Japan wants to make sure its technological undertaking is not misunderstood, like the Fifth Generation was.

Gee, what's to misunderstand about a government mandate to achieve technical dominance of the world by 1991? And speaking of that technical dominance, what is going to happen to the Fifth Generation? Will it be shelved in order to focus on the more important goal of creating a more comfortable environment for all of mankind? Not on your life.

The Fifth Generation Project opened its doors to foreign investors in 1986 when it ran into the same problems that the U.S. Microelectronics and Computer Technology Corp. did: corporate defections, interdivisional competitiveness and acrimony and a need for more money.

The Sixth Generation will not have to worry about these problems, though. The plans call for an international fund to provide monies, as well as an exchange of research discoveries and information for the benefit of all. Thus, Japan and other participating countries would share resources and costs to make the project work, plus give freely of new technological innovations.

Now, if Nakasone thought we misunderstood the Fifth Generation Project, he hasn't seen anything yet. Even with noble ambitions, how does he expect to get this thing to work properly? Hasn't he ever watched the United Nations in action?

Less user-hateful

Personally, I like the general idea of the project. Seeing as we keep trying to legislate the "allowable" amounts of harmful pollution and materials while still

Continued on page 24

Newquist writes and consults on artificial intelligence and other advanced high-technology topics from his office in Scottsdale, Ariz.

Weathering a changing climate?

Survival of the fittest can produce a leaner, more focused NCC

AMY WOHL

The National Computer Conference has always been rather like the elephant described by a group of encircling blind men: What you thought it was depended on your point of view (or, in this case, point of contact).

To the academic community, NCC was a good place to present a computing paper and get it properly published. To the business user community (particularly the large users), it was, in its best years, a good place to see what the computer industry was doing. ("Good" was not only a matter of big. When NCC got too big, as it did in Houston in 1983, products, trends and new companies were all obscured by the noise, the heat and the confusion.)

To vendors, it was the one show to be in: Sell off another piece of the corporation, accrue expenses you have absolutely no idea how to afford, but get there or disappear.

Tragicomedies

In fact, at the height of its most overcrowded glory, furious small or tardy vendors would threaten to sue NCC and its sponsor for failing to have space to rent to them. This pressure led to such tragicomedies as the 115-degree tent in Anaheim, Calif., complete with weary barkers in pin-striped cut-offs and the far-flung colonies of lonely vendors in Las Vegas's most distant hotel ballrooms.

However, NCC is no longer the world's largest computer circus. In its 1983 heyday, NCC attracted nearly 100,000 registrants, counting (in typical computer industry fashion) every preregistered no-show, janitor and scantily dressed magician's assistant. Last year, NCC entertained about 35,000 or 40,000 attendees, exhibitors and participants.

In fact, NCC's managers, a hard-working conglomeration of volunteers and a few paid staff members, had labored in happier times to discourage vendors and attendees, in the hope of containing the show's size and manageability. The ill-fated Office Automation Conference (OAC) was actually (at least in part) planned by NCC sponsors in order to attract some vendors to exhibit at another show, leaving more NCC floor space for the "real" computer vendors.

RICH TENNANT

Schizophrenia

NCC has traditionally suffered from several troublesome facts, such as:

- A somewhat schizophrenic air for a show whose exhibits are a big and important business enterprise (and an important source of income to the American Federation of Information Processing Societies (AFIPS), one of its sponsors) but whose conference is an intellectual enterprise. This intellectual enterprise is managed in alternating years — or so it seems — by academics bent on permitting only the newest and purest of research or marketeers looking to satisfy the end users and eliminate anything that appears to be too theoretical (like what's coming next).
- AFIPS and NCC understood success pretty well and how to manage it. They have had, however, many more difficulties in dealing with a new and fragile show (or a mature and dwindling one) that needed marketing and promotion. That, in fact, is one of the reasons its other shows (OAC, NCC/TC) never had a chance.
- NCC's exhibitor crowd was late to understand and appreciate the impact of personal computers. Their early history at NCC was largely in the role of stepchild, relegated to basements and off-site facilities with separate proceedings that emphasized their lack of connection to the "right stuff."

This attitude left the field wide open for Comdex to cater strongly to the PC crowd. By 1985, Comdex was the show for PCs — not just for the vendors and distributors (their target audience) but also for the users of any size. When the computer industry's fortunes temporarily dipped, some PC vendors chose to remain at Comdex and drop their booths at NCC altogether.

This action not only made NCC suddenly much smaller, it also made the conference much less relevant, since so much of the computer industry's future is tied up in PC-based workstations, software and systems. Comdex's organizer, the Interface Group, struck another blow at NCC last week by announcing a general, industrywide show of its own for March 1988 in Chicago.

The styles in shows are cyclical. When an industry, or a new product cycle within an industry, is getting under way, vendors and customers need big exhibitions. In the cauldron of these big shows, with everything somewhere on the floor, things somehow get sorted out.

When an industry or product is further along, vendors need a big show less. They begin to lust for single-vendor events, where they capture the full attention of

Continued on page 24

Wohl is president of Wohl Associates in Bala Cynwyd, Pa., and editor of "The Wohl Report on End-User Computing" newsletter.

Weathering

CONTINUED FROM PAGE 23

a much better identified audience. Or, at the least, for vertical market shows where they can offer a better optimized product to a particular, well-targeted customer.

That, of course, is what's happening now. DEC World may have been larger than the 1986 NCC — and its September 1987 version, so large that it has to span several weeks (Boston proving otherwise unstretchable), is almost sure to be bigger. Specialty shows for vertical markets (legal, banking and manufacturing) or product areas (local-area networks, computer-aided design and manufacturing and desktop publishing) abound.

While these fortunes wax, others wane. Imagine a 1987 show devoted to word processing, for instance!

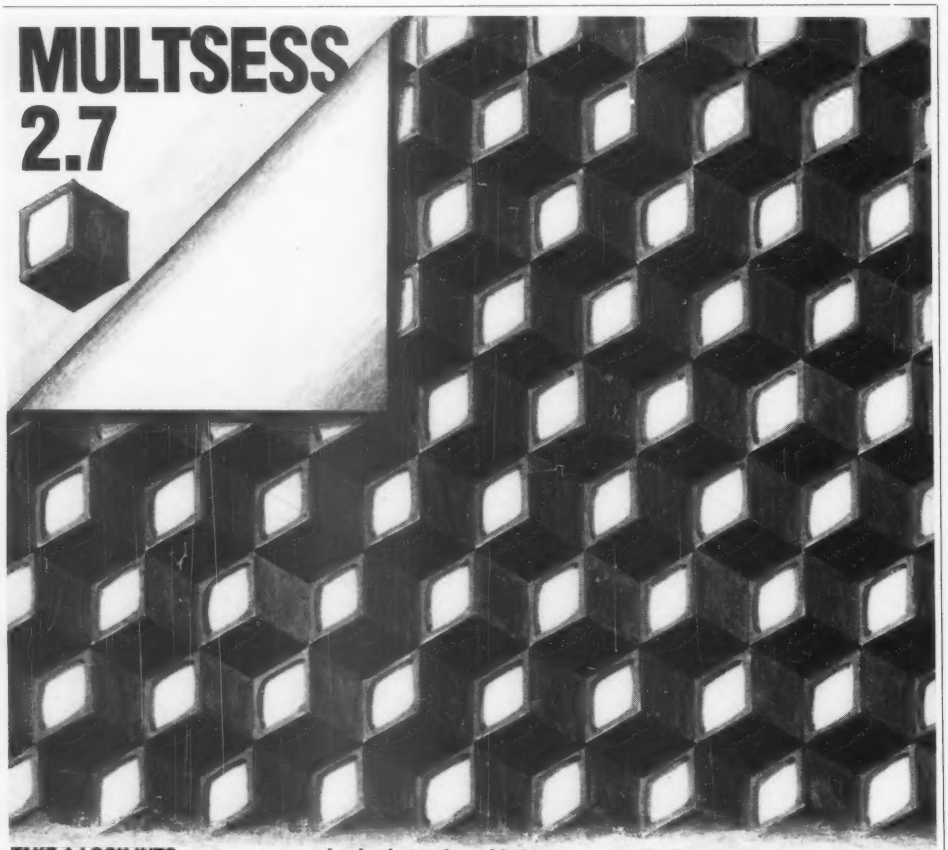
Other shows do poorly because they are ahead of their time (the topics are too scary, the audience as yet undeveloped) or out of synch with an industry announcement cycle (guess how well a March 1987 show on new Intel Corp. 80386-based micros would have done, preceding IBM's entrance to the marketplace).

The fickle mistress

But fashion is a fickle mistress. And the cycles governing computer shows' success or failure have been known to turn, however slowly. The big shows could yet return, fueled by an industry heating up to hustle new PCs, a resurgence of more powerful minis or an outburst of applications software.

The more that smaller firms enter the game, the more important shows become as a display place to lure new investors and customers, to make it clear that a new trend is building and to position themselves strongly within that trend. When the need for big shows returns — as it surely will — a leaner NCC could be ready to handle the business and take advantage of the opportunity.

Or if it doesn't pay attention, get ahead of the trends and prepare to once again lead the parade, NCC could get left behind in a flurry of dust and history, a stately dinosaur that has outlived its time.



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CONTINUED FROM PAGE 23

manufacturing them, nondestructive technologies for the production of energy and other resources is a pretty good idea. And there are some good examples of the creation of such things in the biological world (from the organism down to the molecular level). It seems technologies built on such a basis would indeed be less user-hateful, simply because, as humans, we are organisms that perform some of these functions.

The problem here, however, is that the specifics are missing. There is no logical tie from the Fifth Generation to the Sixth. One deals with the greatest possible advance in computer technology in a limited time frame to benefit a select group of people. The other deals with technology to make all humans breathe a little easier and enjoy life a little more. It sounds too much like a fast-food commercial, and it clouds the issues by having two separate projects undertaking two separate and not entirely related goals.

Much to my dismay, there are a lot of question marks in this column, and the question mark is my least favorite form of punctuation. But from everything I've seen of what's going into the proposal, we've got more questions than answers. The proposal for the Human Frontier Science Program is being presented to the world at this month's economic summit in Venice. Japan will throw the ball to the world court at that time and see if there are any takers. Even though it has come up with the plan, it is depending on the rest of the world to help support it and achieve the goals — not like the Fifth Generation, in which Japan wants to do it all on its own.

Any country could have come up with this plan, and it would still sound a little too naive. The fact that Japan sports another "Generation" project running at the same time makes it a little bit more suspect.

Who knows? Maybe I'm just too cynical. Maybe this is really it — the Generation to end all Generations. Maybe we will all band together to create technology in a noncompetitive spirit, one that allows us to exchange information without fear of any one user putting it to their own benefit. Maybe Nakasone will disband the Fifth Generation Project and share the discoveries already made with the rest of the world so that we can all utilize intelligent machines. And maybe pigs will fly.

Security

CONTINUED FROM PAGE 22

most managers indeed take appropriate action when information systems people present a credible case for investing time and money in this important area.

Now is the time for technologists to adopt a unified position that security measures are not only prudent but a normal part of doing business with computer and data communications systems. We must stop acting like ostriches, take our heads out of the sand and assist management in directly confronting the realities of a serious situation that affects us all.

Charles Cresson Wood
Independent Information Systems Security Consultant
San Francisco

JANUARY 12, 1987 COMPUTERWORLD

Codd: Supra surpasses DB2

By Charles Babcock

SAN JOSE, Calif. — Edgar F. Codd, president of the Relational Institute here, has concluded that the next release of Cincom Systems, Inc.'s Supra is truer to the relational model than IBM's DB2, even though Supra still lacks a language comparable to IBM's SQL.

Codd reviewed the documentation for Cincom's Supra Release 1.3 and concluded that it adheres to 10 of the 12 rules with which he defined the relational model. Release 1.3 is being tested by Cincom and will not be available until June or July.

Codd compared Release 1.3 of Supra with Release 2 of DB2, which became available in March 1986. DB2 met seven of the 12 rules. IBM is widely anticipated to [illegible] of DB2 this [illegible] preparing a

of all those I have reviewed to date. Assuming that the product performs according to the documentation, IBM's DB2 Release 2 has less fidelity to the relational model than Cincom's Supra Release 1.3," Codd said in a letter to David A. Wood, Cincom's senior product manager for systems software. Cincom had requested the evaluation.

Despite its high rating, Codd [illegible] falls short on two points of [illegible] model as defined by his [illegible] (CW, Oct. 14 and 21, 1[illegible] equivalent of IBM's SQ[illegible] and offers only [illegible] high-level [illegible] mands.

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INSIDE

Celanese creates software subsidiary/**26**

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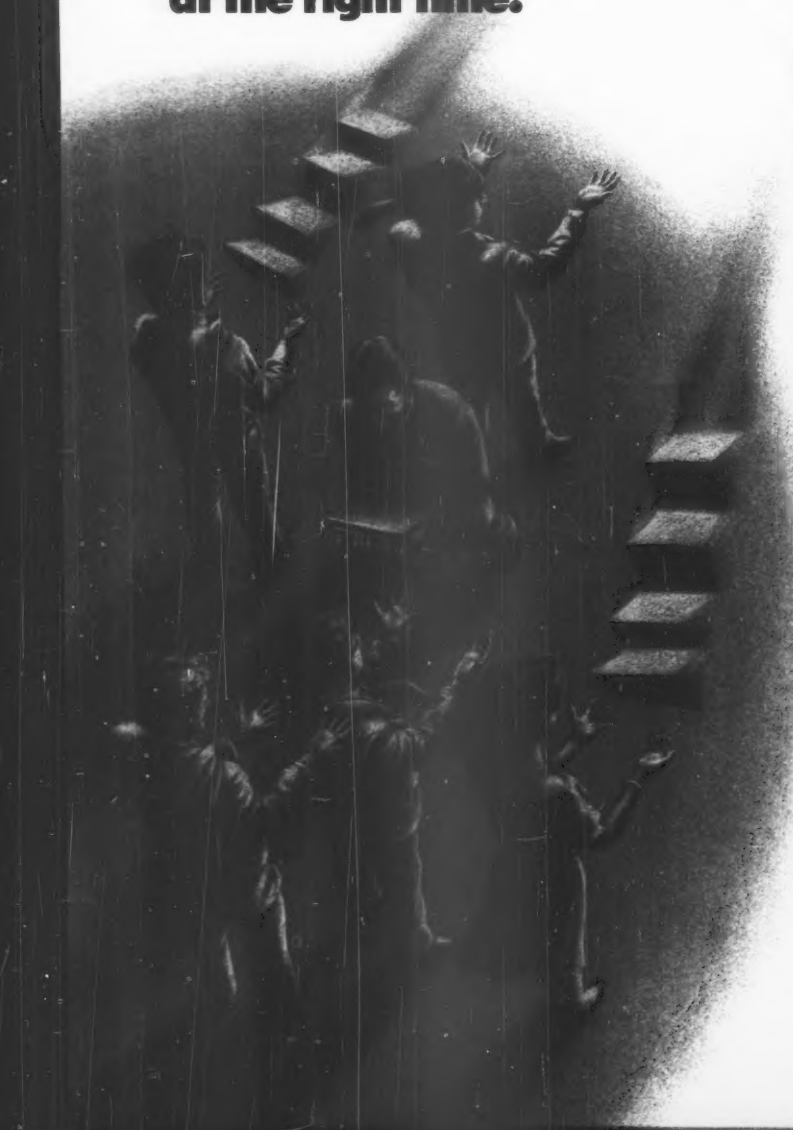

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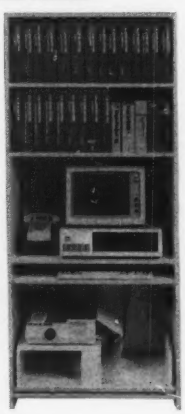

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SOFT LINE

John R. Vacca

AI diagnoses MVS ailments

Twenty years ago, operators of IBM's MVS operating system provided both problem-handling expertise and control over the normal allocation of computing resources. Since then, the allocation of computing resources has been largely automated, but the problem-handling abilities of large-systems operators have been only partially automated.

This is because of the complexity of detecting, diagnosing and responding to the range of unusual but possible systems problems and the variation in operational policy among computing centers, which make it difficult to select a single "correct" scheme for responding to operational problems.

IBM is trying to address the task of automating the problem-solving side of MVS operations through development of the IBM Yorktown Expert System/MVS Manager, known as YES/MVS. Through development of this system, the automation of MVS operations will be possible in the near future, according to spokesmen at IBM's White Plains, N.Y., facility. Some informed observers of the project predict IBM will be able to announce a product as early as the first quarter of 1988, but IBM spokesmen have not confirmed such a schedule.

At least in the foreseeable future, each computing center will have the option of having an expert system tailored to its operations. No single expert sys-

Continued on page 33

Users point to Sybase potential

Say relational system offers speed, on-line transactions, portability

BY ROSEMARY HAMILTON
CW STAFF

Early users of the Sybase, Inc. relational data base management system recently reported that preliminary testing of the product shows it has great potential for transaction-oriented environments.

"It's the first time that someone has been able to show that a relational DBMS can handle an on-line transaction system," said Peter Kuzmak, a senior systems project leader at Johns Hopkins Hospital in Baltimore, where a beta-test version of Sybase was installed late last year. "It's able to provide the relational query capabilities that all the others provide, but it also has very fast update facilities."

Since introducing its SQL-based relational DBMS last year, Sybase, located in Berkeley, Calif., has been scoring points at beta-test sites that represent a diverse group of industries but that share a need for a transaction-oriented system. The software runs on Sun Microsystems, Inc. 32-bit workstations under Sun's version of Unix as well as on the Digital Equipment Corp. line of VAX computers under DEC's VMS.

The vendor has an agreement with Microsoft Corp. [CW, May 18] that is intended to enable the microcomputer software vendor to use Sybase technology for a relational DBMS running on the IBM Personal System/2.

Cautious optimism

Sybase for Sun's Unix version and DEC's VAXs was made generally available last month. Since the fall of 1986, users in hospitals, banks and engineering environments have been testing the system, primarily on the Sun workstations. They cautioned that the system has not yet been put in production but said prototype applications have shown that the system is well-suited for an on-line environment.

"So far, we've created access scenarios with data extracts from our other data bases," said B. K. Richard, director of advanced technology in the Information Systems Group of the TRW, Inc. facility in Long Beach, Calif. "Sybase looks real good, but we haven't stressed it yet. For as early as we took it, it's a very clean product."

Users said that unlike other relational DBMSs, the Sybase system is more suited for a transaction-oriented environment because of its architecture. The system separates the data base itself from the data base applications.

The data base component, called the Dataserver, can reportedly reside on a different system than the front end, called the Data Toolset. As a result,

Continued on page 32

Enhanced link gives PC users VTAM access

BY CHARLES BABCOCK
CW STAFF

SAN FRANCISCO — A micro-to-mainframe link firm is scheduled to announce tomorrow a version of its link that allows a personal computer user access to a host as a VTAM application.

Running as a VTAM application, Excellink/Host-V from On-Line Business Systems, Inc. can be assigned a high or low priority in relation to other work in progress on the mainframe, keeping PC users from competing with production applications, said Barry Hansen, general manager of On-Line Business Systems' software division.

A second advantage to having a link that functions as a VTAM application is that it avoids the overhead of links that access the host via IBM's TSO, Hansen said.

Multiple users

Multiple users may sign on to Excellink/Host-V and use its services while assigned to a single address space on the host, he said. TSO-based links require the IBM MVS operating system to assign an address space per user, with the possibility of slowing TSO response times if it is already in use, Hansen said.

A VTAM link opens access to operating system files more easily than a CICS-based product because CICS "likes files strictly defined in command-level Cobol," according to Hansen.

An Excellink/Host-V user must request authorization from a host security monitor each time he attempts to access a host file. The link interfaces to security packages such as Computer Associates International, Inc.'s CA/Top Secret and IBM's RACF, allowing existing security procedures to be followed after the link is implemented, the vendor said. The link comes with an option that is said to allow users to carry on sessions with other VTAM applications.

Continued on page 29

Speakers: CASE tools misused

BY CHARLES BABCOCK
CW STAFF

CAMBRIDGE, Mass. — Two speakers at an opening session of a recent workshop on computer-aided software engineering (CASE) agreed that a proliferation of CASE tools does not guarantee a highly automated software development environment.

The tools are "very useful, very powerful and not very well implemented," said Susan Ball, a San Diego-based consultant on implementing CASE. She said she has seen Index Technology Corp.'s personal computer-based software design and analysis tool, Excelerator, used for file layout and Nastec Corp.'s Design Aid used for presentation graphics.

"Case tools are generally misused," agreed Jerry Grochow, vice-president of American Management Systems, Inc., a custom applications firm based in Arlington, Va., that developed and markets a CASE tool set.

And in some cases, the speakers said, development staffs decline to use CASE tools at all. "Some people say CASE will stifle creativity — which many times is exactly what we want to

Continued on page 33

Inside

- Cullinet to add on-line Performance Monitor. Page 29.
- Wisconsin utility uses text DBMS to help protect cables. Page 32.
- Bennett revamps job scheduler for MVS mainframes. Page 35.

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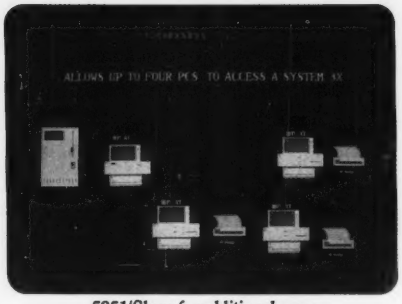

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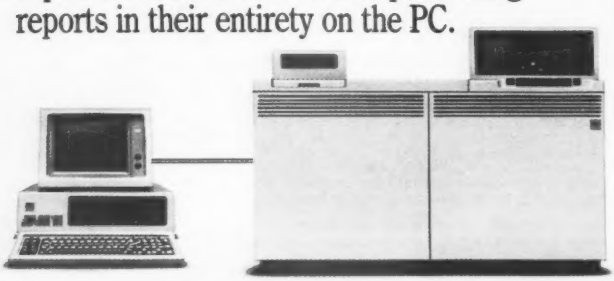

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Enhanced link

CONTINUED FROM PAGE 27

The link also comes with an optional application programming interface to allow a micro application to request services from the host. The Excellink/Host-V interface is HAPL, which is similar to a combination of PL/I and Basic.

The language is interpretive, allowing mainframe programmers to write and debug interface programs interactively, the vendor said. CICS-based links frequently must discover bugs in the interface code by permitting them to run in a CICS region. "With HAPL, all errors are trapped through the interpretive process. They're not going to bring the system down," Hansen said.

The link is available for $12,500 as a VTAM application, with an additional charge of $5,000 for Session Passthru Option and $5,000 for HAPL. A full-screen edit option to be used with HAPL costs an additional $5,000.

VM software manages DCSS

BY ROSEMARY HAMILTON
CW STAFF

ARLINGTON, Va. — VM Systems Group, Inc. expanded its line of systems software for the IBM VM operating system with a utility that manages discontiguous save segments (DCSS).

V/Seg, which began shipping last week, has a one-time license fee of $7,450 or can be licensed on a yearly basis for $2,650, the vendor said.

The VM DCSS architecture reduces the storage demand on the system by allowing multiple users to execute a program simultaneously. The program is loaded once into memory instead of loading a copy for each user who requests it.

Tools to manage DCSS programs

V/Seg is said to provide a system administrator with a number of tools that will more effectively manage DCSS programs. One V/Seg feature allows the system administrator to update the table of DCSS programs stored in the Control Program component of VM. Without V/Seg, a user needs to regenerate this table by shutting the system down and reloading, said Thomas Kumpf, a systems programmer at VM Systems. With V/Seg, a user can make changes to the DCSS table on-line, Kumpf said.

V/Seg also assists a system administrator in coordinating the locations of different DCSS programs in memory, Kumpf said. Since program usage is constantly changing, a system administrator can define a number of address spaces for a given program. When a user calls that program, V/Seg will automatically assign that program to the address space that will best fit in relation to other programs running at that time, Kumpf said.

In addition, V/Seg is said to allow system administrators to define multiple versions of a given program, such as production and testing versions, which would then be represented in the DCSS table under different names. When an end user requests that program, V/Seg automatically assigns the production version.

Cullinet takes Performance Monitor on-line

BY ROSEMARY HAMILTON
CW STAFF

WESTWOOD, Mass. — Cullinet Software, Inc. has revamped its batch-oriented Performance Monitor software to an on-line system, and said the new version will begin shipping at month's end.

Release 10.1 of Performance Monitor, designed for use with the vendor's IDMS/R relational data base management system for the IBM MVS environment, carries a one-time license fee of $27,000.

Current users of Release 10.0 can upgrade free of charge, according to Les Smith, a Cullinet product manager.

Release 10.1 of Performance Monitor includes two new components that provide on-line and real-time capabilities, Smith said.

"Adding these two packages makes it complete, which it really wasn't before," Smith said.

Monitors resources concurrently

The Realtime Monitor component is said to allow users to examine resources in real-time or while the resources are being utilized. The monitor has a windowing feature that allows multiple resources to be monitored concurrently, according to the vendor.

The System Interval component is said to provide wait statistics that users can analyze on-line.

The earlier release of Performance Monitor was a batch-oriented system.

"Before, it was used for chargebacks, billings and to track CPU usage," Smith said.

This capability is now called the Application Monitor, considered the third component of Release 10.1. Users can analyze information for chargeback purposes on-line, although Smith said it will "probably be utilized more for its batch reporting capabilities."

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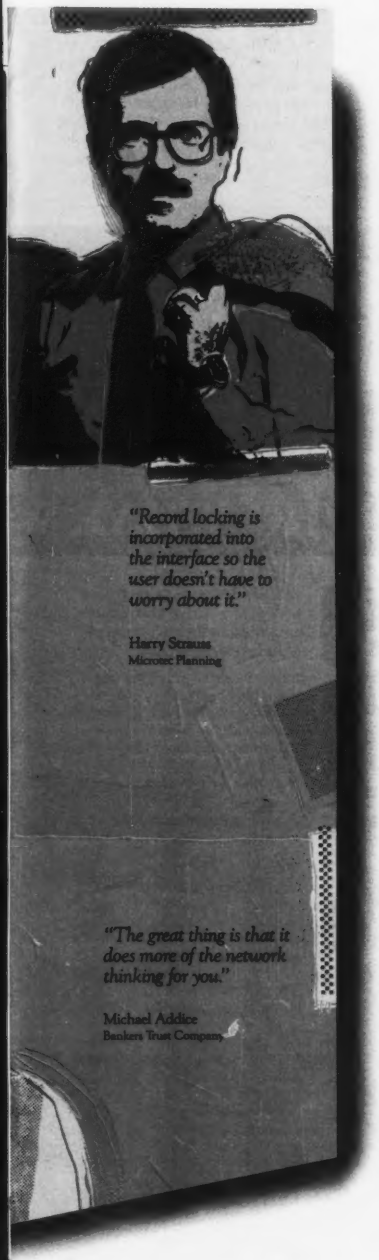
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Data base prevents accidental cable cutting

BY JEAN S. BOZMAN
CW STAFF

MILWAUKEE — If you want to dig a hole in eastern Wisconsin, the Wisconsin Electric Power Co. has to know about it. The eastern Wisconsin utility keeps 151,000 records of underground cables and conduits in its tape and disk drives so that none of its 850,000 customers breaks into a cable by mistake. Often, it has to provide data to customers in 72 hours or less.

A statewide "Diggers Hotline" has been in place for years — the state provides it in an effort to help home builders and general contractors stay out of trouble — but the automation of the queries began in April, when Wisconsin Electric directed all Diggers Hotline data entry requests to an IBM Personal Computer in the company's Milwaukee offices. The PC reads the data from the query into an IBM VSAM sequential file on the utility's IBM 3084 mainframe.

For the last three years, the task of keeping all those records straight, as well as 264,000 drawings of the company's power plant wiring, has been given to Infodata Systems, Inc.'s Inquire/Text data base. An indexed data base designed in the 1970s, Inquire/Text was installed at Wisconsin Electric in 1982. It has since been updated to include gateways to major data base management system structures, including Cullinet Software, Inc.'s IDMS/R and IBM's IMS, which store other data lists.

The recent automation of the process still has a manual component. If anyone wants to see a diagram of the cables, he has to look it up on microfilm. However, the direct tie-in to the Diggers Hotline has extended Wisconsin Electric's electronic network of 2,000 users one step further.

Requests centralized

"We now have one central source of requests, and the hot line PC automatically sends data to our IBM 3084 mainframe," says Theodore Hahm, a senior computer analyst in Wisconsin Electric's data services division. "After the data is fed into our mainframe, we use a program we've written to load the information into the Inquire data base."

Inquire/Text is running under IBM's TSO under MVS/Extended Architecture on the power company's 3084 mainframe. An information network of 2,000 users is supported by 800 IBM 3270 terminals and 200 IBM PCs and compatibles. For other tasks, the Inquire commands can be used to query data bases set up under IDMS/R, IMS, SAS Institute, Inc.'s SAS system and Information Builders, Inc.'s Focus language.

The variety of interfaces was one reason why Wisconsin Electric turned to Inquire three years ago and why it is active in the Midwest Inquire users group today. "Inquire has direct interfaces to several products, notably IBM's ISPF full-screen editor," explains John Bell, a data services division computer analyst who specializes in Inquire.

Relational data bases, such as IBM's DB2, have not been added to the system yet, Hahm says, but that does not rule them out in the future. For now, the sequential data bases seem to work well for Wisconsin Electric, which must keep lists with thousands of elements in each. "When you have hundreds of thousands of records, and you can quickly retrieve the 15 you want, you're doing well," Hahm says.

Sybase

CONTINUED FROM PAGE 27

front-end functions such as query or application development are not taxing the same system's resources that the Dataserver must also use for processing. Those resources can be dedicated to the Dataserver, thereby allowing the faster processing required for a transaction-oriented environment.

This architecture will be useful to the work underway at Jet Propulsion Laboratory in Pasadena, Calif., which is involved in a National Aeronautics and Space Administration project that will eventually photograph and map the surface of Venus, according to Karen Kinamin, a contract engineer at Jet Propulsion. "We will be loading data in all the time, and we'll have to do it very fast," she said.

Jet Propulsion, she added, is currently performing benchmark tests on Sybase running on a Sun workstation against a Britton Lee, Inc. dedicated data base machine. Results are not yet available. However, one key advantage is its portability, Kinamin said. "You can put it on a faster machine if you want," she said. "It allows you to move up with the hardware technology — to a bigger VAX, for instance — whereas with Britton Lee, you just get a box."

Paul Trotter, manager of automation in the corporate finance group at Chemical Bank in New York, said he believes the Sybase architecture will help him support a large number of users. Trotter said his division is "just looking at Sybase as a possibility for a DBMS." Beyond the speed issue, which he said appears good, the Sybase architecture would also help him in maintaining the DBMS, he added.

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MVS ills

CONTINUED FROM PAGE 27

tem can do the job for everyone, since operations vary widely from site to site. The strategy employed by YES/MVS is to simplify the development of such expert systems by providing a standard knowledge base that can be customized to reflect the unique characteristics of individual computer centers.

In general, expert systems like YES/MVS are computer applications that use explicitly represented knowledge and computational inference techniques to achieve a level of performance comparable to that of a human expert in some application area or domain. YES/MVS is an experimental expert system for the domain of IBM's MVS/JES 3 operation. The first version, called YES/MVS I, was regularly used in the computing center of IBM's Thomas J. Watson Research Center in Yorktown Heights, N.Y., for most of a year. YES/MVS I assisted with the operation of a single MVS/JES 3 system running on an IBM Model 3081K.

From the experience gained with YES/MVS I, a decision was made to develop a second version, YES/MVS II, that would significantly improve on the breadth and depth of function provided by YES/MVS I.

Overall, several software techniques have come out of the YES/MVS effort. For MVS users interested in automating large-system operations, the most important technique to come out of IBM's experience with YES/MVS has been the automation of complex decision-making processes that operators use to detect, diagnose and respond to problems in large computing complexes.

Customization techniques

In addition, this experience has led IBM to consider several different techniques with which to aid MVS users in addressing the customization and maintenance problems at their sites. Among these techniques are the following:

- Enhancing the development environment — languages, debugging and testing tools — available for encoding and refining the knowledge base for large-systems operation.
- Increasing uniformity in approaches to problem handling so that greater portions of the problem-handling knowledge can be organized as system-supplied services.
- Seeking the most general approaches to specific types of problems so that only parameterization or minimal customization is required to reflect the unique characteristics of a computing center.
- Exploiting uniformity across types of operational problems to develop a knowledge-acquisition tool intended to assist the user in customizing the knowledge of how to respond to a particular type of operational problem.

Future automation of MVS operations is not a matter of building a single expert system; rather, it's a matter of building a family of related expert systems. Thus, the focus of YES/MVS is to provide an expert system shell that is the basis for automating operations in a family of expert systems.

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CASE tools

CONTINUED FROM PAGE 27

do," quipped Grochow, citing the ability of a well-structured CASE approach to impose standard development techniques on a programming staff.

Ball said MIS organizations need the assistance of automated software development tools because they must take more of a "mass production approach" to application development.

She drew an analogy with the auto industry; at its start, she said, the industry was dominated by craftsmen who turned out few units a year but scored major innovations with each succeeding model. Software development is at a similar stage today, she suggested, and recommended greater interchangeability of parts, integration of standards and techniques and finding tools to support them. "Integration [of the different phases of software production] is where the problem lies," she added.

Many of the tools on the market cannot integrate a design and analysis tool with a code generation and testing tool, and it would take a tool vendor three years and an estimated $78 million in research and development effort to produce the tool set required, Grochow claimed.

Nevertheless, MIS managers can receive a productivity boost by implementing selected CASE tools, and most vendors can be expected to offer better integrated tool sets during the next few years, Grochow predicted. Tools must be carefully selected to match existing methodologies, or entrenched methodologies changed to take advantage of the capabilities of a new tool set, he said.

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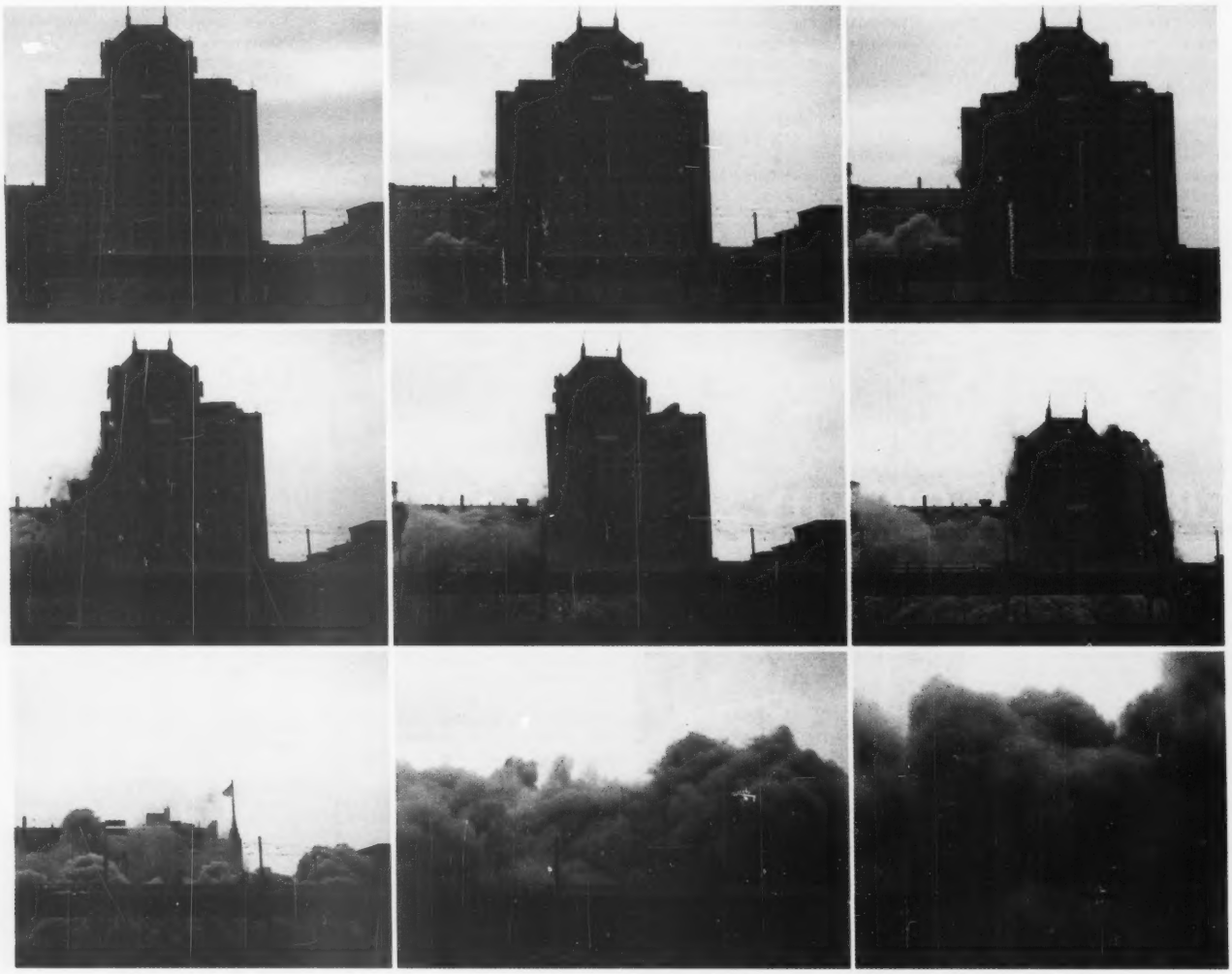

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NEW PRODUCTS

Systems software

Bennett Software, Inc. has announced **Release 2.3** of the **Jobtrac** scheduler system for IBM MVS mainframe environments.

Release 2.3 enhancements include a distributed scheduling option allowing any number of TSO users at up to 256 separate locations to initiate, monitor and update independent or interactive schedules. Command-level security can be defined by a central administrator for each user within each location. Also, a problem-analysis facility allows direct-access storage device free-space analysis and reserve research to be conducted directly from the schedule displays.

A permanent site license costs $48,500.

Bennett Software, P.O. Box 96694, Houston, Texas 77213.

PC-Interface, software designed to provide users with access to Digital Equipment Corp. Ultrix files and processing power from a variety of Microsoft Corp. MS-DOS-based personal computers, is available from **Locus Computing Corp.**

PC-Interface is said to bridge operating environments and offer connectivity and functionality between PCs and an Ultrix host by integrating Ultrix and MS-DOS into a transparent, distributed processing system. It offers file access, processor and printer services, network security and VT100 terminal emulation, the vendor said.

PC-Interface is available for DEC computers running Ultrix 1.1 or 1.2. It costs $500 for one server and $250 for each individual bridge diskette.

Locus Computing, 3330 Ocean Park Blvd., Santa Monica, Calif. 90405.

Concurrent Computer Corp. has enhanced its **Xelos** operating system for its Series 3200 line of superminicomputers.

Xelos is a port of AT&T's Unix System V operating system. The new version includes an enhanced C compiler that uses peep-hole optimizing to provide increased performance. It is compatible with the System V Interface Definition as certified by the System V Validation Suite.

Xelos is priced from $1,400 to $29,950.

Concurrent Computer, 197 Hance Ave., Tinton Falls, N.J. 07724.

Applications packages

MCBA, Inc. has introduced **Release 3.2** of its accounting, distribution and manufacturing software for Wang Laboratories, Inc.'s VS minicomputers.

According to the vendor, Release 3.2 includes the option to integrate the Wang Office office automation package into the system, thus allowing users to enter Wang Office from within the MCBA system and to distribute reports by electronic mail.

Other features include support for the Wang VS operating system 7.10, additional fields in the print-options screen and the ability to specify priority and security levels for report distribution.

Prices for Release 3.2 cost from $2,000 to $12,000 per package.

MCBA, 425 W. Broadway, Glendale, Calif. 91204.

Cognex Corp. has announced its **Character Recognition Software Toolkit** for the Cognex 2000 single-board machine-vision system.

The software package is said to be user-trainable, meaning that users can teach the system to read specific type styles or fonts. The system can be trained to read arbitrary symbols, shapes and part of outlines as well as alphanumerics. It can also read raised and stamped lettering, tolerate image degradation, contrast fluctuation within the image and ignore extraneous information adjacent to the characters of interest, the vendor said.

The system is priced between $10,000 and $25,000.

Cognex, 72 River Park St., Needham, Mass. 02194.

Apogee Systems, Inc. has announced its **Prospector** telemarketing software system.

Prospector features integration with Data General Corp.'s CEO system, management-monitoring capabilities, the ability to interface with automatic-call facilities and call accounting. It handles telemarketing-related activities such as incoming and outgoing calls, autodialing with or without voice-sensing, data base development on customers, prospects and sales patterns, call-back tracking, compilation of target-prospect lists and scheduling.

Prospector was designed for Data General's 2-bit computers and supports up to 1,000 users. It costs from $10,000.

Apogee, 60 Brigham St., Marlboro, Mass. 01752.

Languages

Step Engineering, Inc. has ported its **Metastep Language System** to Sun Microsystems, Inc.'s Model 2 and Model 3 workstations, operating under Sun's version of the Unix operating system.

The Metastep Language System is a comprehensive language definition, design, programming and debugging system. Features include a free-form and position-independent syntax, listings of

Continued on page 38

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Continued from page 35

macro expansions, field assignments, default assignments, symbol cross-references and table listings, automatic hardware-to-software bit-position mapping, field-checking and pipeline-delay facilities, constraint management, consumption of older Advanced Micro Devices, Inc. assembler code and 28 expression operators.

The Metastep Language System costs $3,000.

Step Engineering, 661 E. Arques Ave., Sunnyvale, Calif. 94086.

Utilities

GT Software, Inc. has announced **BMS/GT 5.5** and **Assist/GT 2.0**, utilities for CICS.

BMS/GT 5.5 is said to add input validation and editing to screen generation. It is an on-line, self-prompting screen generator for CICS, which can generate and modify CICS/BMS maps without Macro Assembly.

Assist/GT is said to enhance Help screen and menu processing for CICS.

The product features documentation formatting, the capability to run concurrent CICS sessions and the ability to scroll through Help information within a window, according to the vendor.

Release 5.5 of BMS/GT and Assist/GT 2.0 each cost $5,500 for VSE and $6,900 for MVS.

GT Software, 1111 Cambridge Sq., Alpharetta, Ga. 30201.

Amalgamated Software of North America, Inc. has announced **Termin8**, a utility for the IBM System/36.

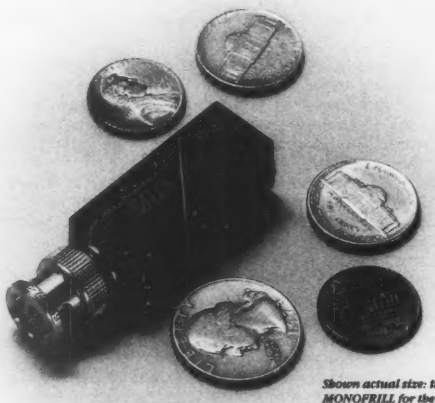
Termin8 is said to shut down programs, procedures and printers, allowing procedures and programs to run dedicated. It issues a dynamic Stop Workstation command to all terminals except the system console.

Termin8 reportedly shuts down programs that are in a wait state. It will not attempt to shut down noncancelable tasks. If a program is not in a wait state, Termin8 will wait until it is and then close it down.

Termin8 is priced at $100.

Amalgamated Software, Suite 225, 4041 MacArthur Blvd., Newport Beach, Calif. 92660.

Small change for the better



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Data base management systems

Compuserve Data Technologies has unveiled **System 1022 DBMS, Version 120A** for Digital Equipment Corp. TOPS 10/20 environments.

The enhanced version of Compuserve's data base management system allows users to move personal computer data into a DEC system. Users can also design System 1022 applications using the System 1022 programming language and its Forms facility. This simplifies adding, updating and exploring data, the vendor said.

Another feature of Version 120A is variable-length text attributes, which enable the system to store significant characters in values without reducing functionality.

A System 1022 DBMS license costs from $22,500 to $72,000.

Compuserve, 1000 Massachusetts Ave., Cambridge, Mass. 02138.

Services

Compudata Translators, Inc. has announced a **data translation service.**

The service allows users to specify the related media as well as the source and destination environments in the form of computer types, operating systems, software and the nature of the applications.

According to the vendor, both dedicated and software-based word processors are supported. Translation fees for word processing files range from $45 to $55 per disk. Spreadsheet file translation costs $65 per source disk.

Compudata Translators, Suite 301, 6565 Sunset Blvd., Hollywood, Calif. 90028.

Development tools

Team Engineering, Inc. has announced the **Tiger User Interface Tool Kit**, a software package said to enhance application development on Sun Microsystems, Inc. workstations.

Tiger is a tool for designing, developing and implementing user interfaces. It provides interactive utilities and a library of data-driven subroutines.

Tiger is implemented in the C language. It is priced at $7,500 for the first license and $2,500 for each additional license. A development site license costs $22,500.

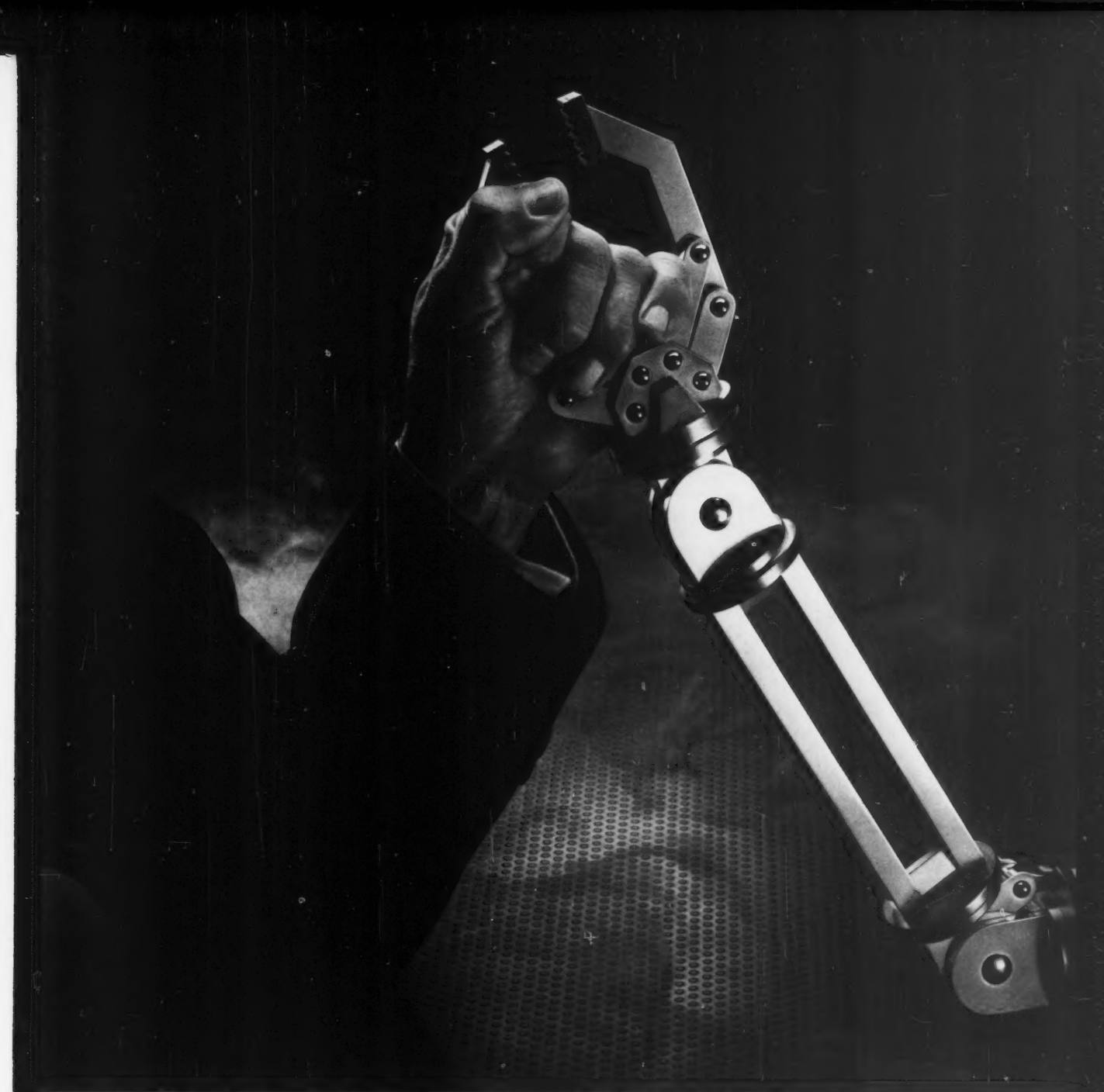
Team Engineering, 735 A Chestnut Ave., Santa Cruz, Calif. 95060.

VAX GKS software, **Digital Equipment Corp.**'s graphics product, has been updated to conform to level 2C of the ANSI and ISO Graphical Kernel System (GKS) standard for two-dimensional device-independent graphics.

VAX GKS Version 3.0 runs on all VAX/VMS systems. It is a development tool said to allow application programmers to produce computer-generated pictures. It provides asynchronous sample and event input and features support for the Computer Graphics Metafile and additional generalized drawing primitives, escape functions and device support.

VAX GKS Version 3.0 application-development licenses cost between $900 and $28,500; runtime-only licenses cost between $180 and $5,700.

DEC, 146 Main St., Maynard, Mass. 01754.



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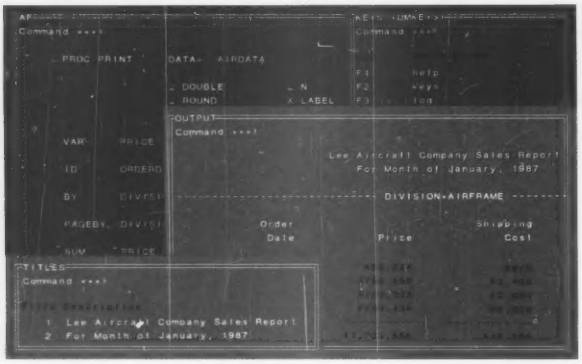
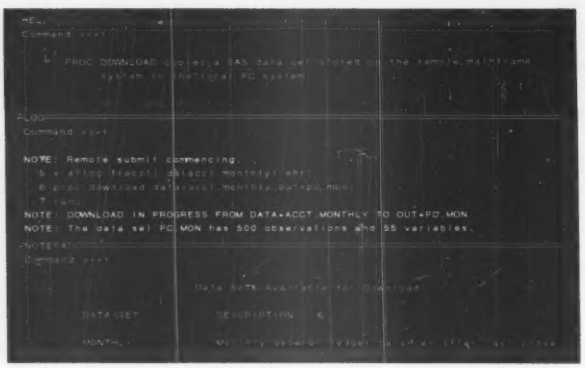
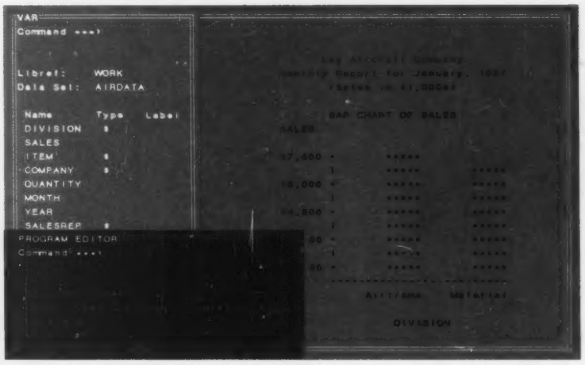


2 Connectivity. With the SAS System for personal computers, you get a built-in link to your host SAS System. You can download corporate data; develop, test, and run applications on your PC; or move data and applications back to the host for execution. Plus the SAS System reads data from any kind of file, including dBASEII,® dBASEIII,® and Lotus® 1-2-3.®


Command ===>
NOTE: Remote submit commencing.
NOTE: DOWNLOAD IN PROGRESS FROM DATA=ACCT.MONTHLY TO OUT=PC.MON
NOTE: The data set PC.MON has 500 observations and 55 variables.

3 Integration. The SAS System runs on mainframes, minicomputers, and personal computers. The language and the syntax are the same. The full-screen text editor is the same. You only have to learn one software system no matter what hardware your company has installed.



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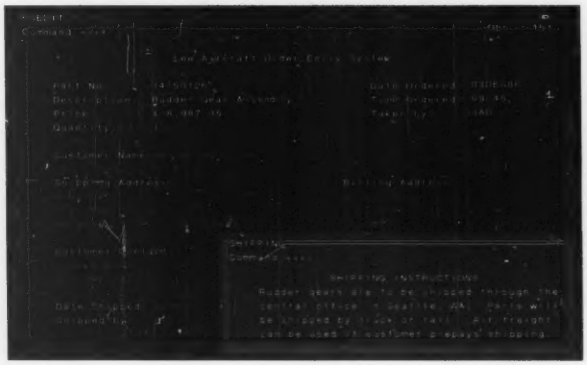

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The SAS System runs on the IBM PC XT and AT, IBM 370/30xx/43xx and compatible machines, Digital Equipment Corporation's VAX™ and MicroVAX II,™ Data General Corporation's ECLIPSE® MV series, and Prime Computer, Inc.'s 50 series. Not all products are available for all operating systems.

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MICROCOMPUTING

SMALL TALK

William Zachmann

A cure for C-sickness

Personal computers have already had a tremendous impact on the industry. International Data Corp., a market research firm in Framingham, Mass., shows that more than one-third of the value of system shipments by U.S. vendors in 1986 was in personal computers; $3 million worth of PCs were sold for every $2 million worth of mainframe systems.

Despite this, the full impact of personal computers has hardly begun. Until now, they have largely been used for personal productivity applications. For the most part, they have been used in addition to, rather than instead of, traditional mainframe and minicomputer systems.

The real impact, then, of PCs will be as alternatives to traditional systems. It is only when users start designing personal computers into major corporate systems that their full potential will be reached.

Contrary to what many still think, the result will be a devastating reduction in the demand for traditional mainframe and minicomputer systems. The vastly superior price/perfor-

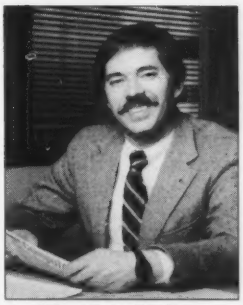
Continued on page 43

Data base firms ready for battle

Microrim exec says competition under OS/2 a 'partially new ball game'

Although the microcomputer data base market is hotly competitive, it is still largely dominated by one firm — Ashton-Tate. A firm that has stayed very much alive despite battles with Ashton-Tate is Microrim, Inc., developer of R:Base System V.

The arrival of OS/2, a micro operating system jointly developed by IBM and Microsoft Corp., will herald an all new data base enviroment in which micro data bases are most often accessed by multiple users. The competition in the market will be fierce, with Ashton-Tate, Lotus Development Corp. and Microsoft vying for a share. Oracle Corp., Cullinet Software, Inc., Applied Data Research, Inc. and IBM will also enter the battle.



Microrim's Erickson

Wayne Erickson, chairman of Microrim, recently spoke with *Computerworld* Senior Editor Douglas Barney about the changing data base environment and how his firm expects to reap continued success.

Why is OS/2 important for data base software?

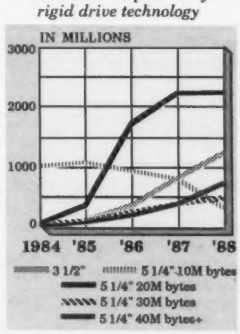
You can add more features because of the larger memory space. Several of the things you get with OS/2, however, you get automatically — such as multitasking, which is very important for the data base environment. We actually demonstrated a data base that had three tasks running on the same machine at the same time. One was doing a background report generation, another was a background batch

Continued on page 44

Data View

Personal computer forecast, 1984 to 1988

Worldwide shipments by rigid drive technology



INFORMATION PROVIDED BY INTERNATIONAL DATA CORP.
CW CHART: SUSAN ALDAM

Cordata PC supports CGA

BY DAVID BRIGHT
CW STAFF

ATLANTA — Cordata, Inc. announced last week at Comdex/Spring '87 a compact $1,095 IBM Personal Computer-compatible system that comes standard with a built-in monitor and support for IBM's Color Graphics Adapter (CGA).

Manufactured by Daewoo Corp. in Korea, the system is based on an Intel Corp. 8088-2 microprocessor, which operates at either 4.77 or 8 MHz. Standard motherboard memory is 512K bytes, upgradable to 768K bytes. The system comes with a built-in tilting 12-in. monochrome monitor that supports 640- by 400-pixel resolution and 16 shades of gray for emulating colors.

In addition to CGA support, the machine also includes support for AT&T PC 6300 graphics and text. Cordata said the addition of the AT&T PC 6300 support enables the machine to use the screen's full resolution for applications such as computer-aided design and manufacturing, which CGA supports only at lower resolution.

The 14- by 15-in. system comes standard with four full-length expansion slots, two 360K byte floppy disk drives and a 130W power supply. Options include a controller-mounted 20M-byte hard disk drive for $599 and a 300 to 1,200 bit/sec. internal modem for $129.

Softcraft unbundles Xtrieve

BY ED SCANNELL
CW STAFF

AUSTIN, Texas — Softcraft, Inc., a subsidiary of Novell, Inc., has unveiled a relational data base query language that sports a more efficient way of collecting data in multiuser environments.

Called XQL, the programmer's tool is modeled after IBM's SQL, which uses English language commands to execute data base functions.

XQL is said to allow programmers to get access to groups of records rather than retrieve them individually. The program accomplishes this through a subroutine interface to the data base manager that is accessible through Basic, C and Pascal programming languages.

The idea for XQL was generated by requests from the company's customers for access to the data base routines within Btrieve, Softcraft's menu-driven query program.

"Programmers working with

Continued on page 42

Inside

- Zenith announces low-cost PC with Microsoft interface. Page 42.
- Program allows C, assembly languages to address up to 16M bytes of code. Page 42.
- Migent offers integrated software package for IBM PCs. Page 45.

Persoft develops textual organization tool

Claims info retriever based entirely on existing hardware technology

BY ALAN J. RYAN
CW STAFF

ATLANTA — Bucking the trend of incorporating advanced technology in new products, a tool in the works at Persoft, Inc. in Madison, Wis., is said to be based on existing hardware technology.

The product is called Ize, which represents its ability to conceptualize and organize. The tool was shown to the press and leading dealers in a private meeting here last week at Comdex/Spring '87.

The product, which is scheduled to be ready for fall shipment, addresses the problems of retrieving textual information. According to company President Ed Harris, those problems have been around for many years. "All [the computer] can find is what you ask it to find. Basically, when you're working with a text base, you don't have a good idea of what's in there and how it's organized," he said.

Creates table of contents

But Ize reportedly works differently. Harris said it looks at key words in the text and, in doing so, can deduce an underlying structure of how the text is organized. Then, Ize is able to display that structure in a table of contents format.

"The beauty of this [process] is that if you do a retrieval, instead of getting back something that says, 'There are 300 items that satisfy this query,' you get back a table of contents, which is dynamically generated by algorithms in the software," Harris explained.

One unique aspect of the program, Harris said, is that while it is innovative, "there is nothing in existing hardware technology advances which was required to invent this solution for organizing textual information. This solution could have been done five years ago on a mainframe system." Ize will likely sell for $200 to $500, the company said.

The product was developed by Paul Kleinberger, a U.S.-born inventor working in Jerusalem. Kleinberger brought the Ize idea to the U.S., seeking a distribution agreement. Eventually, the developer struck a deal with Persoft, which also markets the Smarterm family of terminal emulation products.

Patent pending

Persoft currently has a patent pending on the product to protect the technology, Harris said.

"Our intention with the patent is to use it for licensing. Our goal is not to restrict people from using it; we don't want to control it, but we want to license it for many environments," he added.

The current version of Ize is a personal computer version, Harris said. "We will be adapting it to a network version for delivery in 1988, as we feel the value of it increases even more when you can network people together with it," he added.

Harris said that the product currently is being shown only in private demonstrations. "At this time, we want to give people an idea of what is coming up. We're looking for feedback," he said. "But we're not in the habit of doing formal product announcements until we're close to a ship point."

Zenith PC incorporates MS-DOS interface

BY DAVID BRIGHT
CW STAFF

ATLANTA — Zenith Data Systems Corp. announced at last week's Comdex/Spring '87 a low-cost personal computer that reportedly includes an easy-to-use character-oriented MS-DOS interface, provided by Microsoft Corp.

According to a Zenith spokesman, the new Eazy PC is targeted at lower end markets that Zenith previously did not serve.

The small footprint system uses 3½-in. floppy disk drives. A system with a 14-in. monitor, 512K bytes of memory and one 3½-in. floppy disk drive will retail for $999, according to the vendor, and a 20M-byte hard disk drive model will be available for $1,699.

The system is built around an Intel Corp. 8088-compatible V40 microprocessor from NEC Corp.

Similar to PS/2 approach

"It's a new design compared to what a stand-alone computer usually looks like," the Zenith spokesman said. "It's more similar to an [IBM Personal System/2] Model 30 approach, with a very small footprint. It has everything that most PC users need at a low price and with a very easy setup. You can get it out of the box and running in a couple of minutes."

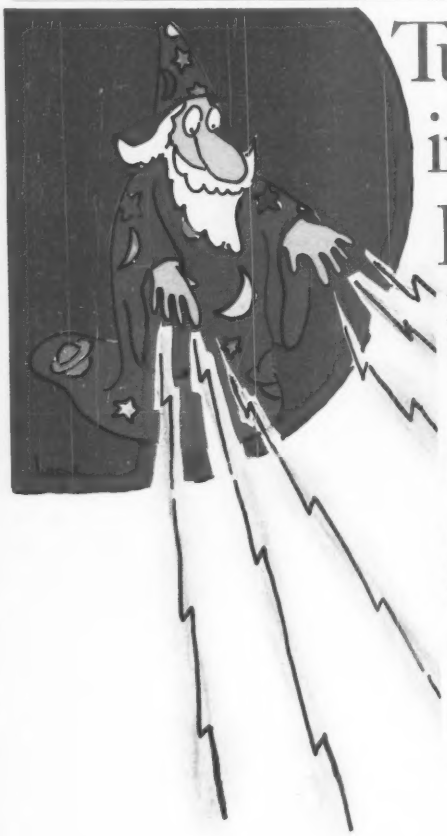
The Microsoft interface, called MS-DOS Manager, is said to eliminate the need for users to deal with the MS-DOS prompt in carrying out operating system commands. Microsoft described the interface as using windows and pull-down menus. The product, however, is not related to Microsoft Windows.

The full range of MS-DOS programs runs with the interface in place, the vendor said.

The Zenith spokesman said this version of the interface software is exclusive to Zenith because it is matched with the new machine's proprietary video characteristics. He added that it is possible Zenith will later offer the interface for its other PCs.

"Over time, you will see it [the MS-DOS Manager] on a wide variety of products," Microsoft Chairman Bill Gates said. He added that the MS-DOS Manager may be sold on an OEM basis to other manufacturers but will not be sold as a stand-alone product.

Jeffrey Tarter, editor of the Cambridge, Mass.-based "Softletter," downplayed the significance of a new MS-DOS interface, saying most users are already accustomed to running their software a certain way. "I can't think of a single product that would gain from this," he added.



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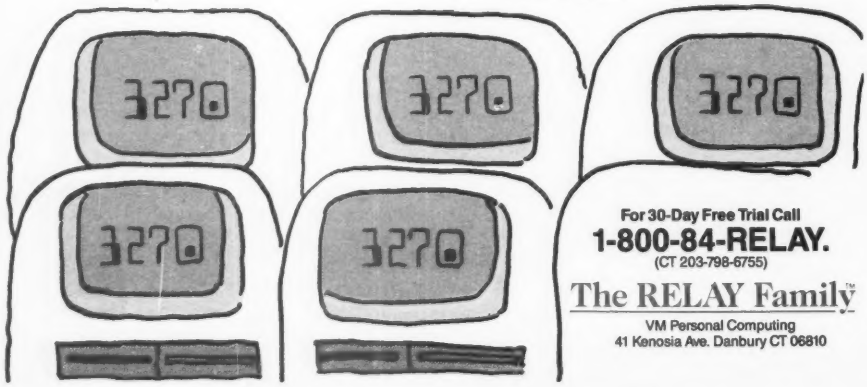

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DOS/16M beats memory barrier

NATICK, Mass. — Rational Systems, Inc. has unwrapped a program that allows C and assembly languages to address up to 16M bytes of code and data running under versions of Microsoft Corp.'s MS-DOS 3.0 and up.

Called DOS/16M, the protected-mode large-memory development environment enables commercial personal computer programmers to access larger data areas for existing programs without leaving MS-DOS. It also gives mainframe and minicomputer programmers the option to run large programs requiring more than 640K bytes of memory on IBM Personal Computer ATs and compatibles, according to Rational Systems President Terence Colligan.

DOS/16M is priced at $29,000, which includes a runtime license to convert one commercial program to run in protected mode. Licensing for additional protected-mode products is available for $10,000 per product. Delivery is slated for July 1.

Softcraft

CONTINUED FROM PAGE 41

Btrieve were telling us they wanted something that offers the high-level commands found in Xtrieve. So we responded by unbundling Xtrieve and making the high-level commands available from within a programming language," said Nancy Woodward, Softcraft's president.

The program offers two data access levels, which are said to address the needs of experienced and novice users. The first level consists of XQL primitives that the company claims has the power of a relational data base without the need for a fourth-generation language. The second level is said to permit programmers to develop software that uses SQL statements to gain access to data.

XQL contains an interactive editor to enter SQL statements directly from the keyboard. It also offers data base management system capabilities, including access to data by name and access to records in user-defined order, a company spokesman explained.

XQL requires Btrieve to operate and is compatible with both single-user and multiuser versions of that product. The program is priced at $595 and will be available late this month, the company said.

C-sickness

CONTINUED FROM PAGE 41

mance ratios in microprocessor-based systems like personal computers spell big trouble for vendors of traditional multiuser systems.

Increasingly powerful PCs, linked by means of local-area networks and supplemented by network servers of various types, offer a far less expensive, more flexible way to build enterprise systems than traditional systems do. Leading-edge users are already beginning to use these more economical alternatives.

Users will need to start thinking very differently about personal computers in order to obtain maximum benefits from them in the future. Building sophisticated systems on PC platforms will require sophisticated systems development efforts.

Off-the-shelf software is generally quite adequate for personal productivity applications. Serious enterprise systems will often require more, however. Organizations that want to maximize the benefits of personal computers will need to make use of powerful development tools and programming languages.

One of the most important of these will unquestionably be the C programming language. Initially developed and used along with the Unix operating system, which is generally written in C, the language is quite capable of standing independent of Unix.

The language of choice

During the past few years, C has emerged as the language of choice for developer's software based on Microsoft Corp.'s MS-DOS for the IBM Personal Computer and compatibles. C compilers from companies like Microsoft and Lattice, Inc. have long been essential tools for personal computer software developers.

Borland International's Turbo C, the newest and, in many ways, most exciting C compiler, comes just at the right time for corporate information systems professionals interested in serious applications development on personal computers. More than just a compiler, Turbo C provides a complete C language development environment at an irresistible price of $99.95.

C is not a language that I would recommend for casual users. It not only is very powerful but also operates close to the hardware. This combination can make C a daunting adventure for the inexperienced user. It is precisely this combination, however, that makes C such an appealing language for the experienced information systems professional.

C makes possible a degree of control over the hardware environment that normally is found only with assembly language programming. At the same time, C has the control structures and other capabilities normally found only in higher level languages.

In addition, C is probably one of the most portable languages. It runs on a wide range of systems, and C code moves from one compiler to another far more easily than most other languages.

Turbo C offers all the advantages of C for IBM PCs and compatibles in a package that is not only inexpensive but also incredibly fast. Turbo C, like Borland's Turbo Pascal, Turbo Basic and Turbo Prolog, significantly increases the baseline against which language products must be judged.

The look and feel of the Turbo C Integrated Development Environment is similar to that of Borland's recently announced Turbo Basic. It is, however, a much more powerful environment, just as C is a much more powerful language than Basic.

A menu bar across the top of the screen provides a means of navigating the menu system. A particularly handy feature is an extensive array of compiler options. These give considerable control over things such as whether to include code for a floating-point coprocessor, what kinds of errors to check for and what types and degrees of optimization to include. In addition, an alternate, more traditional command-line environment is provided for those who prefer it.

An edit window and a messages window are part of the normal display. Compile-time, or link-time, errors are shown in the messages window, and the offending statement, when possible, is highlighted in the edit window.

Unlike Turbo Pascal, Turbo C can separately compile different modules to be subsequently linked into a single executable program. A Make utility, similar to that in Unix, is provided to simplify managing and linking programs.

An extensive library of C functions is provided with Turbo C. Borland soon should be making source code and source code licenses for the Turbo C libraries at a cost of $295.

The only area in which Turbo C could be significantly improved is in runtime debugging facilities. To the best that I could determine, there are no provisions in Release 1.0 for things like setting break points and generating variable trace logs. Runtime debugging seems to be pretty much limited to flagging the first point at which execution fails.

In virtually all other respects, however, Turbo C is an excellent product that delivers tremendous value for the price. It offers an extremely good way for corporate users interested in building serious applications on personal computers to get started with the language that offers the most effective means to do so.

Zachmann is vice-president of research at International Data Corp.

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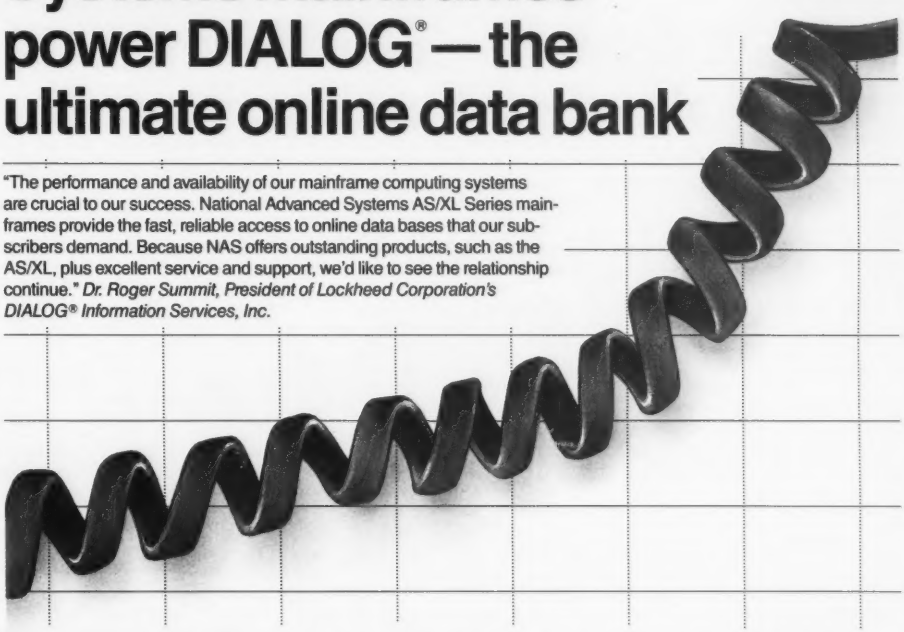

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Toshiba lightens laptops

Battery-operated portable features 20M-byte drive

BY DAVID BRIGHT
CW STAFF

IRVINE, Calif. — Toshiba America, Inc.'s Information Systems Division has introduced two lightweight, battery-operated laptop computers, one of which includes a 20M-byte hard disk drive.

The company has also announced a new version of its T3100 portable system, the T3100/20, that includes a faster 20M-byte hard disk drive in place of the 10M-byte disk drive previously offered. Because of U.S. trade sanctions against Japan, Toshiba had not announced pricing nor availability for the Japanese-made higher end machines at press time.

The company claimed its 6.4-lb T1000 system is the smallest and lightest full-featured IBM Personal Computer-compatible portable system available in the U.S. Toshiba also said the 10.8-lb T1200 is the smallest and lightest such system with a built-in hard disk drive.

Fashioned after Toshiba's T1100 Plus, the T1200 includes an Intel Corp. 80C86 microprocessor running at 4.77 or 9.54 MHz, a socket for an 80C87 math coprocessor, 1M byte of random-access memory (RAM) and one 3½-in. floppy disk drive in addition to the hard disk drive. The system's 80- by 25-line supertwist LCD offers 640- by 200-pixel resolution and IBM Color Graphics Adapter (CGA) compatibility.

The machine comes with a built-in clock/calendar and ports for a parallel printer, an RS-232C serial communications device, red-green-blue color video, composite monochrome video, an external 5¼-in. floppy disk drive and a numeric keypad. The system has one expansion slot, and Toshiba said it can be connected to an IBM PC-compatible expansion chassis with five slots.

The unit is powered by a nickel cadium battery pack or AC current.

T1200 options

Options include an internal 300 to 1,200 bit/sec. modem compatible with Hayes Microcomputer Products, Inc. modems, a floppy-link device for transferring data with systems that have 5¼-in. floppy disk drives and a numeric keypad.

The $1,199 T1000 system is based on an Intel 80C88 microprocessor and comes with 512K bytes of RAM. Like the T1200, it includes a 3½-in. floppy disk drive, a supertwist LCD, IBM CGA compatibility, a real-time clock/calendar and six ports. Memory is expandable to 1.28M bytes. The adjustable 80- by 25-line display offers 640- by 200-pixel resolution.

The system can be powered by a rechargeable nickel cadium battery said to last up to five hours or by AC power.

Microrim

CONTINUED FROM PAGE 41

update, and as the foreground task we were running a forms program to do data entry and modification.

Are you writing for Microsoft's Presentation Manager or just for OS/2?

Both. As far as the Presentation Manager, the initial versions of OS/2 will not have that built-in. We want to have a product available when OS/2 first comes out, which means that it can't be dependent upon the Presentation Manager.

How important is OS/2 for your users?

We hear two different things. There are some people, such as power users, who, if they could get OS/2 today, they would. Others have a lot invested in my existing hardware and applications and really don't want to change right away. What that means for us is that we will have to continue to support the PC- and MS-DOS Version 3 environments for some time.

When will OS/2 overtake IBM's PC-DOS and Microsoft's MS-DOS Version 3 and above?

It will probably be in the 1990s. We really don't know how long a life the PC- and MS-DOS versions have.

How will the nature of data base products change under OS/2?

It depends upon what environment you are talking about. For stand-alone use, a server concept doesn't apply but multitasking does. For people on networks it will do a better job of finding data for us. We are looking at doing a more effective job of allowing multiple users to work with the same data base in a LAN [local-area network] environment.

How interested are you in IBM's OS/2 Extended Edition?

Given the announcement date, it's hard to say. I mean, they will announce when the announcement will be announced. We will be looking to provide the kinds of interfaces that we have today but having the data come from an IBM DB2 environment.

Does OS/2 Extended Edition, with its SQL component, lessen the need for you to develop your own SQL?

We will have to do some things there, because not everybody will have the OS/2 Extended Edition. Some of our users are interested in SQL. Others ask, "What's that?" A lot of the use of SQL will be hidden from the user and will be used to ask for data from another system.

How is the role of MIS changing in regard to implementing microcomputer applications?

As more and more PCs get hooked together in LANs and more complex operating systems emerge, the role of MIS will become increasingly important. If people with PCs want to be connected to the mainframe, they will need the cooperation of MIS.

How will the competition among data bases change with OS/2?

I think it will be a partially new ball game but not a whole new environment. As people move to OS/2, it is not like they are starting from scratch. They will be really interested in how easily they can migrate data and applications upward.

How does artificial intelligence fit into the OS/2 environment for Microrim?

A lot of the things we did with the Clout [natural-language data base interface] product involved people asking a question and having the program figure out where it is going to get that data. We see the OS/2 environment as making more use of the behind-the-scenes process to define data for people that put it together the way they want. The end user does not have to do much of the actual legwork.

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NEW PRODUCTS

Systems

Tektronix, Inc. has announced the **Plot 10 Advanced PC Graphics** family, including the Plot 10 PC4100 Graphics coprocessor board, a 640- by 480-pixel multiple-line rate graphics monitor and the Plot 10 PC-05 and PC-07 software emulation packages.

Designed for use with IBM Personal Computers, the graphics board is said to provide processing speeds of up to 1 million instructions per second, based on the 32-bit Texas Instruments, Inc. TMS-34010 Graphics System Processor. The Plot 10 PC-05 offers emulation of the Tektronix 4105 terminal, and the PC-07 emulates the firm's 4107 terminal.

The Plot 10 PC-05 price starts at approximately $495; the PC-07 price starts at about $995. The PC4100 price starts at about $1,800, and the monitor price starts at approximately $950.

Tektronix, P.O. Box 500, Beaverton, Ore. 97077.

Micro-MRP, Inc. has announced a turnkey version of its MRP II products based on its **MAX, The Production Manager** software and IBM Personal Computer hardware.

A typical turnkey MAX system accommodates 12 users and is configured with a variety of peripheral devices. The software includes bill of materials, inventory control, interface, master scheduling, material requirements planning, purchasing control, shop floor control, report writer, costing, management performance, interplant and accounting.

A four-user turnkey MAX product is priced at about $1,000 per month. A 12-user system costs about $2,000 per month.

Micro-MRP, 1065 E. Hillsdale Blvd., Foster City, Calif. 94404.

Software applications packages

Migent, Inc. has announced **Ability Plus**, an integrated software package for IBM Personal Computers.

The five applications in Ability Plus include relational data base, spreadsheet, word processing, graphics and communications. Users are said to be able to see the effect that changes made in one application have on another application using the same data. Applications can be displayed in common, not segregated, environments and users can remain within Ability Plus and shift between applications.

Other features include a built-in spelling checker, macros, IBM Enhanced Graphics Adapter support and a printer driver creation program.

Ability Plus costs $199.

Migent, P.O. Box 6062, Incline Village, Nev. 89450.

Software utilities

F/22 Press has introduced **More Perfect**, a collection of macro utilities designed for use with the Wordperfect Corp. Wordperfect word processing program.

According to the vendor, More Perfect increases editing speed and capacity and simplifies printer-feature control by using two-key commands. Some two-key command features include killing the line the cursor is on, killing everything to the left of the cursor, transposing two letters, transposing two words, restoring small cuts and embedding Epson America, Inc. control codes for printing.

More Perfect is available on 5¼-in. disk for IBM Personal Computers and compatibles. It costs $19.95.

F/22 Press, P.O. Box 141, Leonia, N.J. 07605.

NBI, Inc. has announced **Multinet/One** and **Softclone** personal computer networking products.

Multinet/One is said to provide NBI and IBM PCs with shared access to Microsoft Corp. MS-DOS-based multiuser applications software. Softclone is an MS-DOS utility said to allow Lotus Development Corp.'s 1-2-3 to operate on NBI systems.

Multinet/One is priced at $1,595. Softclone is included in the Multinet/One package.

NBI, P.O. Box 9001, 3450 Mitchell Lane, Boulder, Colo. 80301.

Vendex Pacific, Inc. has announced the **Vendex Headstart** operating environment for its Turbo-888-XT IBM Personal Computer-compatible system.

Headstart is said to continuously guide the user through the computer's operations. It includes random-access memory (RAM) utilities such as diagnostics and copy format.

The Turbo-888-XT features include a monochrome monitor, 512K bytes of RAM, two floppy disk drives, a parallel port, a serial port, word processing software, a spreadsheet, a data base, an interactive computer-training program and pop-up programs such as a calendar and a notepad.

The Vendex Turbo-888-XT is priced from $995.

Vendex Pacific, Suite 438, 40 Cutter Mill Road, Great Neck, N.Y. 11021.

Barrington Systems, Inc. has added the **Clarion Translator**, a compiler module that generates .EXE files execut-

Continued on page 46

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	IBM 5225	MegaLine Mod 5225
Lines/Min	280-560	2000
Characters/Line	136-198	136-198
Lines/Page	66-88	66-88
Twinax	Yes	Yes
Printer Type	Impact	Non-Impact
Protocol	5225	5225

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Continued from page 45

able directly from Microsoft Corp.'s MS-DOS or IBM's PC-DOS to its Clarion applications development system.

The Clarion Translator is said to produce relocatable Intel Corp. 8086 native-code object modules from the files produced by the Clarion compiler. The object modules can be linked with the Clarion object library to produce executable programs with the extension .EXE.

Priced at $95, the Clarion Translator requires PC- or MS-DOS 2.0 or higher, a linker, an IBM Personal Computer or compatible, 320K bytes of memory and a hard disk drive.

Barrington Systems, 150 E. Sample Road, Pompano Beach, Fla. 33064.

Development tools

Barrington Systems, Inc. has unveiled the **Comm1 LEM**, a Language Extension Module (LEM) said to permit the control of asynchronous communications from within a Clarion program.

Comm1 LEM contains prewritten procedures for writing proprietary communications packages, developing procedures for controlling auxiliary devices such as bar code readers or performing terminal emulation. Protocols such as Xmodem or Ymodem can be written in Clarion.

Features include the ability to receive data concurrently from up to four asynchronous adapters and support for communications ports COM1 through COM4 and for transfer rates of up to 19.2K bit/sec.

Comm1 LEM is priced at $49.50.

Barrington Systems, 150 E. Sample Road, Pompano Beach, Fla. 33064.

Step Engineering, Inc. has added the **Step Performance Analyzer** to its Step-40 SDT Microprogram Development Station.

The Step Performance Analyzer is a hardware and software package that plugs into the Step-40 SDT station and executes under the Step SDT operating system. It is a collection of design and development tools that permits the designer of microprogram-based digital systems to measure operating characteristics of a completed or partially debugged hardware and software system.

Functions include histogram, time tagging, universal address monitor, address tracking and predicate analysis.

The IBM Personal Computer-compatible Step Performance Analyzer costs $3,250.

Step Engineering, 661 E. Arques Ave., Sunnyvale, Calif. 94088.

Software enhancements

Pass Data Systems has announced **Version 2.0** of its **CE-Tree** cost effectiveness analysis system for Microsoft Corp. MS-DOS-based microcomputers.

CE-Tree was designed for performing decision analysis and cost effectiveness analysis. It is said to allow users to model problems with multiple sequential decisions. Standard result reporting includes the expected values of each strategic choice.

CE-Tree costs $195.

Pass Data Systems, Suite 3, 9 Briggs Pond Way, Sharon, Mass. 02067.

Computer Aided Management, Inc. has announced **Viewpoint V2.5** and **Viewpoint Graphics V1.5.**

Viewpoint V2.5, project management software for the IBM Personal Computer, is said to include a disk buffering scheme and resource-load tracing. Viewpoint Graphics V1.5 allows users to create customized plots such as Gantt charts, work-breakdown charts and time-scaled network diagrams. It includes activity descriptions optionally displayed within activity bars and improved format control for multipage plots and reportedly supports the Hewlett-Packard Co. Laserjet and E-size plotters.

Viewpoint V2.5 costs $1,995. Viewpoint Graphics V1.5 costs $995.

Computer Aided Management, 24 Professional Center Pkwy., San Rafael, Calif. 94903.

Softcraft, Inc. has introduced **Fancy Word Version 3.**

Features of Version 3 include a graphics command that allows users to include screen-captured images, PC Paintbrush files and Microsoft Corp. Windows clipboard pictures.

Also included in Version 3 is the ability to include up to 256 characters in Softcraft fonts, full support of bold and italics fonts, landscape-mode printing on Hewlett-Packard Co. Laserjet printers using a Lotus/Intel/Microsoft Expanded Memory Specification (EMS) or Enhanced EMS memory board, support of up to 100 native or downloaded printer fonts and the ability to use any font distributed in HP Soft Font format.

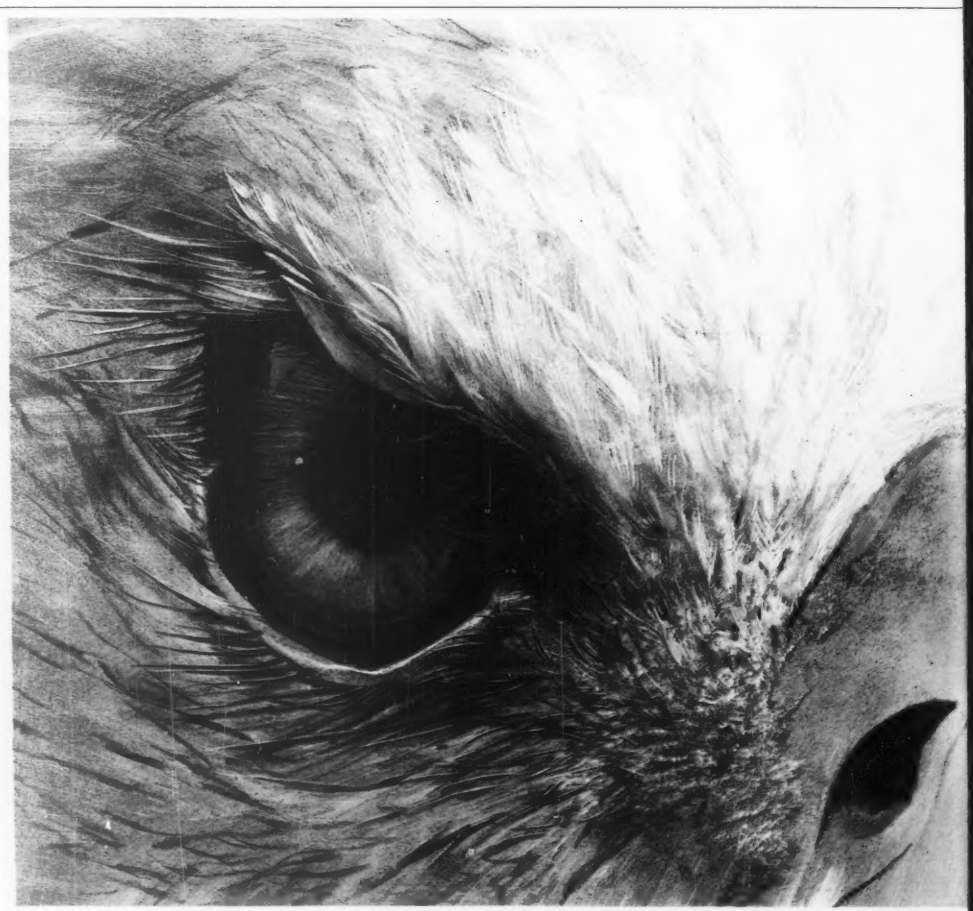
Fancy Word Version 3 costs $140.

Softcraft, Suite 500, 16 N. Carroll St., Madison, Wis. 53703.

Applied Expert Systems, Inc. has enhanced its **Planpower** artificial intelligence-based expert system for personal-finance planning.

Planpower is said to offer recommendations based on comprehensive analysis of a client's financial situation. Release 2.0 is said to include full incorporation of tax reform legislation. It also allows users to guide Planpower's recommendations and to tailor presentation and report formats and streamline client data collection. Release 2.0 includes a batch processing capability.

Planpower is available for lease for $1,250 per month, plus a one-time fee of



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$3,000. A permanent license costs $34,500.

Applied Expert Systems, Five Cambridge Center, Cambridge, Mass. 02142.

Training

Step Engineering, Inc. has introduced the **EZstep Target System and Tutorial**, designed to guide a hardware or software designer step by step to an understanding of microprogram-based design.

Designed for use with the Step Engineering Step-40 SDT Development Station, the package consists of a hardware module, the EZstep Target System and a user's guide tutorial. The target system provides a microprogrammable target system on a board complete with user-programmable faults. The tutorial walks the designer through the paces of setting up the EZstep Target System and using the facilities of the Step-40 SDT Development Station to develop and debug a microprogram-based system.

The Ezstep Target System and Tutorial package costs $575.

Step Engineering, 661 E. Arques Ave., Sunnyvale, Calif. 94086.

Data storage

Peripheral Land, Inc. has announced the **PL20** and **PL30** Tough Drive series of hard-disk subsystems for the Apple Computer, Inc. Macintosh.

Each system incorporates an automatic head lifter and software utilities for multipartition support, desktop-accessory mounter, file locater and formatter.

The PL20 offers 21M bytes of formatted capacity and an average access time of 65 msec. The PL30 offers 31M bytes of formatted capacity and an average access time of 65 msec.

The PL20 costs $999, and the PL30 costs $1,295.

Peripheral Land, 47800 Westinghouse Drive, Fremont, Calif. 94538.

Emerald Systems Corp. has introduced a **150M-byte disk subsystem** for its Microsoft Corp. Xenix and local-area network product lines, and it has reduced the prices on certain of its disk- and tape-subsystem products.

The 150M-byte disk subsystem is said to use the enhanced small device interface. It costs $4,995.

Emerald has reduced the price of its 250M-byte internal subsystems to $7,995; the 315M-byte version now costs $9,995; the 500M-byte models cost $14,995; and the 630M-byte subsystems costs $17,995.

Disk subsystem prices, also reduced, include the 55M-byte versions, to $2,295; the 72M-byte models, to $2,595; and the 118M-byte models, to $5,295.

Emerald Systems, 4757 Morena Blvd., San Diego, Calif. 92117.

CMS Enhancements, Inc. has introduced versions of its entire line of **Macintosh Plus hard-disk subsystems** for the Apple Computer, Inc. Macintosh SE personal computer.

Among the products are the S-20, a 5¼-in. external hard disk drive featuring 20M bytes of storage, and the S-220, a dual 5¼-in. external hard disk drive featuring two 20M-byte drives. The S-40 is a 40M-byte 3½-in. external subsystem, and the Data Tower is a mass-storage subsystem featuring 140M to 960M bytes of storage.

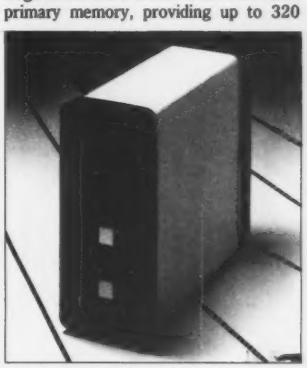
Pricing for the S-20, the S-220 and the S-40 is $995, $1,595 and $1,995, respectively. The Data Tower costs from $3,995 for 140M bytes of mass storage to $15,995 for 960M bytes.

CMS Enhancements, 1372 Valencia Ave., Tustin, Calif. 92680.

Printers/Plotters/Peripherals

Consolink Corp. has introduced the **Megaspooler**, a data spooler for microcomputers.

The Megaspooler is said to offer up to 1M byte of random-access memory for data transfer when plotting or printing large documents. It can be used as either primary memory, providing up to 320



Consolink's *Megaspooler*

typewritten pages of memory, or as additional memory to augment the printer's memory.

The Megaspooler comes with diagnostic and start-up self-test functions. Transmission rates and handshaking may be set independently on each of the serial model's ports.

The 1M-byte version of the Megaspooler costs $999.

Consolink, 1275 S. Sherman Drive, Longmont, Colo. 80501.

Nissho Information Systems has announced the **NP-2405** 24-wire dot matrix printer.

Continued on page 50

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And when we're finished building in the features you demand, we give you reliability features you may never have thought of asking for: Remote and in-service diagnostics. Consistent error-logging. Automatic power failure recovery.* And more.

You see, our engineers gave birth to the Tower family. But your needs have always told us how to raise it.

Today, we stand taller than ever. Our new top-end Tower 32/800 (32-128 users) is built around an ingenious *incremental multiprocessor* architecture. A distributed UNIX that optimizes throughput. And gives you more configuration flexibility than ever before.

It's the latest prodigy in a family of geniuses. Backed up by a $5.9 billion company that spends more than a quarter of a billion on R&D, and maintains an army of 20,000 service personnel in 700 field locations.

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Continued from page 47

The printer is said to print up to six-part forms. It includes a built-in three-way paper feed system, an LCD screen, and nine resident- and seven optional-font cartridges. Print speeds are said to be 250 to 428 char./sec. in draft mode and 80 to 144 char./sec. in letter-quality mode.

Standard emulation for the NP-2405 is Epson America, Inc. LQ-1500.

The NP-2405 is priced at $1,295.

Nissho Information Systems, Suite 100, 10855 Business Center Drive, Cypress, Calif. 90630.

N/Hance Systems, a division of Symphony Systems, Inc., has announced the **Micro 10Plus**, an external tape-backup system for the Wang Laboratories, Inc. Wang PC.

The Micro 10Plus is said to provide 10M bytes of backup storage without using an expansion slot. It operates from the Wang PC's floppy-disk port using an adapter cable that runs from the PC's motherboard to the back of the computers, where the cable's backplate provides an I/O port.

The Micro 10Plus tape-backup system is priced at $899 including the adapter cable. Additional cables are priced at $59.

N/Hance Systems, 908R Providence Highway, Dedham, Mass. 02026.

CIE Terminals, Inc. has introduced the **CI-400** and **CI-800** family of multimode dot matrix line printers.

The CI-400 offers 400 or 800 line/min. draft-mode speed, 300 line/min. in data processing mode, 200 line/min. in memo mode and 85 line/min. for letter-quality output. The CI-800 offers 600 line/min. for standard data processing, 400 line/min. for memory quality and 170 line/min. for letter quality. Both feature a graphics resolution of 200 by 288 dot/in.

The printers also offer bar code and graphics capabilities.

The CI-400 costs $5,395. The CI-800 costs $6,995.

CIE Terminals, 2505 McCabe Way, Irvine, Calif. 92714.

Board-level devices

Vutek Systems, Inc. has announced the **Deluxe EGA** board with resolutions of 752 by 410, 640 by 480 or 896 by 350 pixels.

The board is said to draw up to 16 colors from a palette of 64 and to support all features of the IBM Enhanced Graphics Adapter (EGA), Color Graphics Adapter (CGA), Professional Graphics Adapter and Monochrome Display Adapter. It also provides keyboard switching when changing from EGA to CGA modes.

The board also includes high-resolution drivers for Microsoft Corp. Windows with 120 col. by 50 lines.

The Deluxe EGA board costs $559.

Vutek Systems, 10855 Sorrento Valley Road, San Diego, Calif. 92121.

PC Technologies, Inc. has introduced the **286 Rainbow Plus**, an IBM Enhanced Graphics Adapter (EGA) and accelerator board said to give personal computer users five functions in one slot.

The board is said to combine a 10-MHz accelerator with 16K bytes of cache memory, an EGA and a battery-backed clock/calendar. Also available is an optional small daughterboard with a parallel port and a Microsoft Corp. Inport mouse interface.

The board emulates the IBM Color Graphics Adapter , Monochrome Display Adapter and Hercules Computer Technology, Inc. Graphics Card .

The 286 Rainbow Plus is priced at $945. The daughterboard costs $50.

PC Technologies, Box 2090, 704 Airport Blvd., Ann Arbor, Mich. 48106.

Thomson Consumer Products Corp. has announced the **Thomson Enhanced Graphics Adapter** and the **Thomson Advanced Graphics Controller** for IBM Personal Computers.

The Enhanced Graphics Adapter board is said to be compatible with the IBM Enhanced Graphics Adapter (EGA) standard. An Ultra version provides an implementation of Microsoft Corp. Windows and support for the EGA, Color Graphics Adapter, Hercules Computer Technology, Inc. Graphics Adapter and Monochrome Display Adapter standards.

The Advanced Graphics Controller is based on the Texas Instruments, Inc. 34010 graphics processor and features a 56K-byte cache memory.

The Enhanced Graphics Adapter costs $295, the Ultra version costs $495 and the Advanced Graphics Controller costs $1,195.

Thomson, Suite 111, 5731 W. Slauson Ave., Culver City, Calif. 90230.

Qualogy, Inc. has introduced the **QPC-5211**, **QPC-5212** and **QPC-5213** solid-state disk-emulation boards for IBM Personal Computers and compatibles.

The boards are said to be IBM PC-bus compatible. They can be used as the booting device, for permanent storage for programs or for temporary data storage. Each QPC disk board contains 32 unpopulated sockets.

The QPC-5211 is used with programmable read-only memory (PROM), erasable programmable read-only memory (EPROM) and electrically EPROMs. It can hold up to 2M bytes of PROMs or EPROMs, or 1M byte of electrically EPROMs. The QPC-5212 has 16 sockets for EPROMs or electrically EPROMs and 16 sockets for CMOS random-access memory (RAM).

The boards cost $495 each.

Qualogy, 2241 Lundy Ave., San Jose, Calif. 95131.

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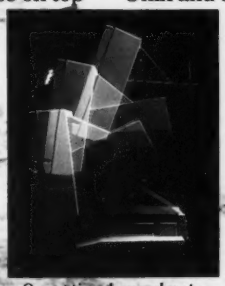

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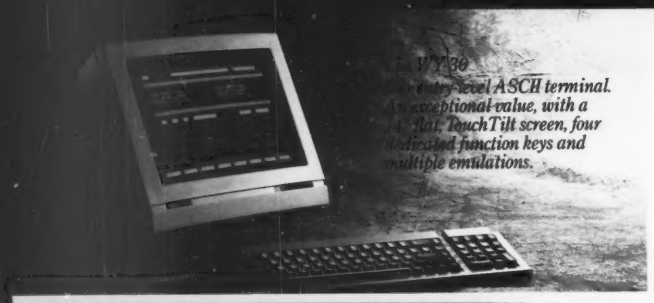
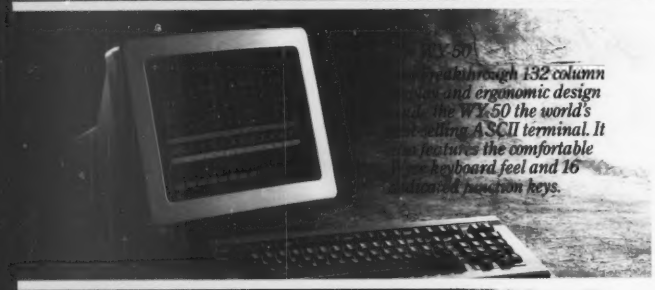
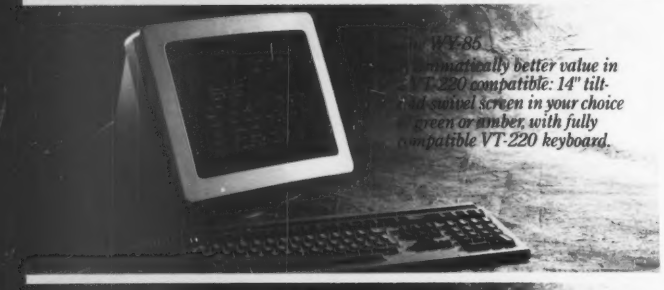


WY-30
...level ASCII terminal. ...ceptional value, with a ...flat, TouchTilt screen, four ...dicated function keys and ...ultiple emulations.



WY-50
...through 132 column ...and ergonomic design ...the WY-50 the world's ...selling ASCII terminal. It ...features the comfortable ...keyboard feel and 16 ...additional function keys.

WY-350
...s the color version of our ...selling WY-50. Its big screen ...range of 64 colors make ...plex data easy to read.



WY-85
...matically better value in ...T-220 compatible: 14" tilt- ...d-swivel screen in your choice ...green or amber, with fully ...patible VT-220 keyboard.

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DATA STREAM

Merv Adrian

Fast times for LAN control

The last year has seen the arrival of what appears, at last, to be the long-awaited "Year of the LAN." The pace of installation of local-area networks (LAN) is accelerating rapidly. Issues of network management, unaddressed until now, have become critical for many organizations.

If these issues are not considered soon, severe problems in production environments may arise before adequate procedures and standards are developed for LAN implementation.

The financial community has been a major adopter of LAN technology. Throughout Wall Street, a number of LANs devoted to trading securities have been and will be installed this year.

Semi-stand-alones

Typically, those networks operate in a semi-stand-alone fashion unless extensive local programming has been done to implement LU6.2-style two-way communications.

The networks send updates to mainframe trading systems during daily processing and often either poll at specified intervals — to receive mainframe updates — or get downloaded information after nightly batch runs, or both.

Trading networks, whether devoted to debt instruments or equities, depend on mainframe systems for a number of data requirements and, more important, must communicate with mainframe data bases to keep various accounting, inventory and customer files current on both sides.

Overnight updates

A typical design for this portion of the application is one in which overnight batch updates are performed via LAN-to-mainframe communications links.

Problems arise, however, when there are technical difficulties on the LAN. At present, the network management software used to monitor the computing resources of large computer networks is only beginning to include facilities to monitor, audit and manage LANs from the central site.

Continued on page 56

Nets on the rise, ISDN on hold

ICA-goers enjoy control, remain unsure of Integrated Services' benefits

BY DONNA RAIMONDI
CW STAFF

NEW ORLEANS — Local-area networks (LAN) and advanced T1 multiplexing schemes are hot; Integrated Services Digital Network (ISDN) is not. So says a survey of International Communications Association (ICA) conference attendees taken two weeks ago by Coopers & Lybrand, a New York-based accounting and consulting firm.

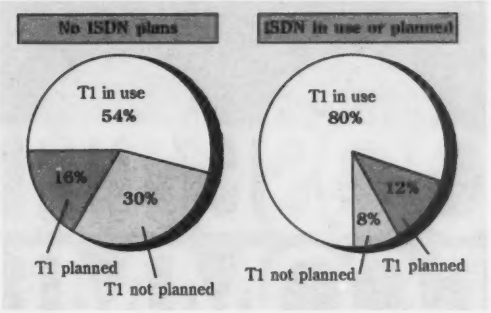
Corporate networks appear to be maturing. LANs and advanced T1 multiplexing schemes are in place by almost two-thirds of the respondents. These figures are expected to rise to 85% for LANs and 75% for T1 multiplexing in the next year.

But ISDN does not yet have much of a following among the users surveyed. Two-thirds of them currently have no plans. "A lot of the telecom managers we talked to at the show — and these are the big guys in networking, because you have to have a minimum $1 million a year in communications expenses to get into ICA — want to keep control of their own networks. They say they have T1, T1 multiplexers and control of their digital services now, and they are not sure that ISDN will give them anything else they need," said Tom Rush, national director of telecommunications and technical services for Coopers & Lybrand. For those us-

Continued on page 55

T1 and ISDN go hand in hand

Survey of International Communications Association attendees finds T1 network installations are more prevalent among companies with ISDN plans



INFORMATION PROVIDED BY COOPERS & LYBRAND
CW CHART

Trio aims at AT&T's foreign vise

BY ELISABETH HORWITT
CW STAFF

NEW ORLEANS — Three major interexchange carriers used the International Communications Association's (ICA) 1987 conference as a sounding board for their strong commitment to breaking AT&T's historical dominance in the international telecommunications market.

Gaps in foreign coverage have "had a detrimental effect on MCI Communications Corp.'s domestic market," admitted Seth Blumenfeld, president of MCI International, Inc. "Multinational customers know that they will need to do software changes to their private branch exchanges in order to use our services, so they are reluctant to switch to MCI unless we give them all the countries they use."

"We really only have a 2-year-old business, since we have only been allowed to serve international customers since two years ago," said Bill Burgess, vice-president and general manager of U.S. Sprint Communica-

Continued on page 53

BBN, Bell Atlantic add to packet-switching lines

BY ELISABETH HORWITT
CW STAFF

NEW ORLEANS — Packet-switching vendor BBN Communications Corp. and regional Bell holding company Bell Atlantic Corp. expanded their packet-switching offerings at the recent International Communications Association (ICA) 1987 conference held here.

BBN announced the Advanced C/10 Systems Network Architecture (SNA) PAD, a CCITT X.25 packet assembler/disassembler (PAD) that allows 3270 terminal users to switch among multiple IBM hosts linked by an X.25 network.

The new PAD is compatible with IBM's Network Control Program Packet-Switching Interface and other IBM X.25 products and reportedly supports two 64K bit/sec. links. The product is set to be available July 1. Pricing starts at $9,350.

Bell Atlantic Network Services, Inc. announced plans to enhance its Public Data Network packet-switching service and to make it available throughout the majority of the region by early summer.

New enhancements to the service, for which Bell Atlantic plans to file tariffs within the month, include point-of-sale ver-

Continued on page 55

Inside

- Multiple vendors complete OSI interoperability testing. Page 53.
- Proteon designs networking kits to ease Pronet setups. Page 54
- Advanced Computer enhances Microvax, VAX processors. Page 58.

Gate ties PCs, mainframes via 3725

BY DONNA RAIMONDI
CW STAFF

ALPHARETTA, Ga. — Digital Communications Associates, Inc. (DCA) has announced a gateway product to allow personal computers on an IBM Token-Ring network to communicate with a mainframe via IBM's 3725 front-end processor.

In another recent announcement, the company released a statement of direction pledging future support of the Open Systems Interconnect (OSI) standard for connection to other vendors' network management systems.

The $395 Irmalan 3725 Gateway requires a dedicated PC to support client workstations.

While the theoretical limit of connections to the 3725 gateway is 256, DCA has not tested "anything close to that," said Sharman Stansell, DCA's product manager. The software is currently configured to support up to 32 connections, she added.

The company has also enhanced its Irmalan Systems Network Architecture and Irmalan APA Graphics workstations so that they can communicate via a token-ring network with the 3725 and the IBM 3174 81C cluster controller. The workstations can operate either as standalone units that communicate directly with the 3725 or 3174 or as client workstations that communicate with the 3725 through DCA's Irmalan 3725 gateway.

Fast and cost-effective

The advantage of the standalone mode is that it eliminates the cost of the gateway and provides quicker response time, said John Bacon, vice-president of marketing for DCA's Personal Computer Communications Group. On the other hand, direct links between the workstations and the 3725 require that the front-end processor support 8K bytes of memory per workstation, Stansell said. The DCA gateway avoids this tax on the 3725's memory.

All three products are geared to very large customers and will be available in the fall.

In a separate announcement recently, DCA claimed it is working toward integrating all of its products under an umbrella architecture. This will allow all DCA products to talk to the network management system and communicate with each other, as well as a wide variety of other vendors' products, either through specially developed connections or through the OSI protocols, including the X.400 electronic mail protocol.

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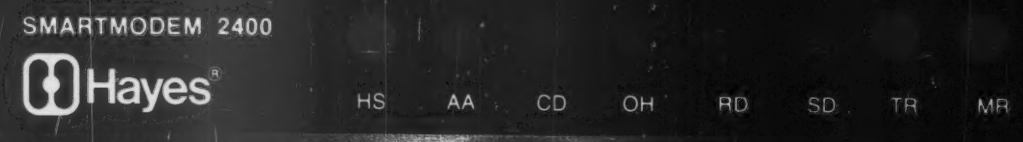

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Second, Hayes has a long-standing and unwavering commitment to customer support, not just to service its products, but to serve as a resource for information, assistance, and technical advice for everyone from the home user to the corporate communications manager. Moreover, Hayes provides more than a warranty on the material and workmanship of its products. Hayes warrants they will perform as promised, as well.

Should you need further data to help you make up your mind, we offer this reassuring statistic: Year after year, more personal computer owners buy far more Hayes modems than any other kind.

And that may be because a Hayes modem is the only modem with the ability to transmit and receive data, and at the same time convey a feeling of peace of mind.

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Vendors finish OSI test drive

Seek to promote research leading to technology's acceptance

BY DONNA RAIMONDI
CW STAFF

A group of vendors and large network users have completed the National Bureau of Standards OSInet file transfer interoperability testing that seeks to pretest Open Systems Interconnect (OSI) network software among vendors before such software gets to the user.

Hardware vendors IBM, Digital Equipment Corp., Wang Laboratories, Inc., Honeywell Bull, Inc. and Sun Microsystems, Inc., along with software vendor Retix Co. and Manufacturing Automation Protocol/Technical and Office Protocol advocates General Motors Corp. and Boeing Computer Services, ran tests in their own research and development laboratories using CCITT X.25 subnetworks to connect to each other, said Joseph Hielscher, Wang product manager.

Specific OSI protocols tested were the ISO FTAM, full ISO session layer, ISO Transport-Class 4, ISO Connectionless network protocol and the X.25. The X.25 network services for OSInet testing were provided by AT&T's Accunet and Wang's Wangpac services.

The OSInet project seeks to promote open testing of interoperability and research leading to acceptance of OSI technology and also to hasten the migration of Transmission Control Protocol/Internet Protocol-based networks toward OSI. It is not a substitute for conformance testing, which seeks to ascertain standards adherence. The conformance testing will be provided later this year by the Corporation for Open Systems, Hielscher said. "This is a test drive of software before it goes to customers. Without this, vendors would be testing at customer sites."

In Wang's case, the tested seven-layer software for multivendor connectivity through OSI protocols is not a product yet but will probably be announced later this year, Hielscher said.

Honeywell certifies PBX link

BILLERICA, Mass. — Honeywell Bull, Inc.'s DPS 6 Plus mid-range computers can now be linked to AT&T System 75 and System 85 digital private branch exchanges (PBX) via AT&T's Digital Multiplexed Interface (DMI).

The two vendors recently announced joint certification of Honeywell Bull's DPS 6 Plus DMI adapter boards for use with the two AT&T PBXs. DMI, an AT&T-licensed set of specifications for Integrated Services Digital Network (ISDN)-compatible links between PBX and host, supports 23 64K bit/sec. data channels and a second signaling channel.

"Certification represents a strategic commitment to multivendor communications by both Honeywell Bull and AT&T," said David Cleary, a vice-president at Honeywell Bull. The introduction also represents a step toward full ISDN networking for Honeywell Bull computers, he added.

One DPS 6 Plus 32-bit computer can support as many as 14 DMI links, with each link supporting up to 16 terminal endpoints. The physical connection is provided on either unshielded twisted-pair wires, AT&T's Premises Distribution System or T1 transmission facilities. The DMI adapter is priced at $4,000 and is available immediately.

Aiming at AT&T

CONTINUED FROM PAGE 51

tions Co.'s International Service. "We're going very slowly, but we're actively negotiating with a number of Postal Telephone and Telegraphs [PTT]. Customers demand international services, especially from their primary carrier."

Entering exchange agreements with PTTs in West Germany and Mexico — respectively, the second and fourth largest calling points worldwide — is a high priority for both MCI and Sprint, company spokesmen told *Computerworld*. "Mexico is a problem because it has close relations with AT&T and limited investment capabilities — it sees other common carriers as a distraction," Burgess said. "The Germans are the archmonopolists of Europe and allow no direct presence of outside carriers; you have to present traffic to them."

During ICA '87, Sprint announced that it now provides telecommunications services beween the U.S. and Venezuela, Bahrain and Portugal. The company had recently added Japan, France, Italy, Netherlands and Switzerland to its roster, bringing the total number of international countries served by Sprint to 37.

MCI, which currently serves 58 international countries, was ready to announce software connecting IBM Disoss electronic mail systems to its telex network [CW, May 25] as a way of expanding its range of international services. ITT Communications Services, Inc. (ITT) announced a similar product, Officeaccess, earlier in May. Also at ICA '87, ITT announced that it now provides international calling to 115 countries for ITT longer distance subscribers and WATS customers.

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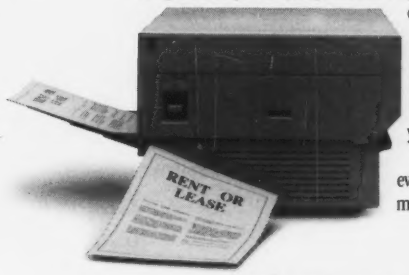

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Proteon eases PC net setup with all-in-one kits

Contain all hardware, software and accessories needed for quick-starting Pronet models

BY PATRICIA KEEFE
CW STAFF

WESTBORO, Mass. — Proteon, Inc. has introduced three networking kits designed to ease setup of its Pronet-4 and Pronet-10 personal computer networks.

Available immediately, each kit reportedly contains all the hardware, software and accessories necessary for users to quickly and economically set up and operate a Pronet PC network.

"The kits are conveniently packaged in a single carton and present a complete network solution," said Proteon Chairman Howard Salwen. Once the starter kit is installed, users can easily add more PCs by upgrading the software and purchasing more hardware, he said.

The kits include the following:

- The P6000 Pronet-4 Network Management Kit. It features the Advanced Network Manager software and eight-node Intelligent Multi-Station Wire Center, which allows users to manage an entire token-ring network from a single data base. Also included are three Pronet-4 IBM Personal Computer interface cards, one Pronet-4 IBM PC AT interface card, a serial bus interface, installation guides, cables and connectors. It costs $5,000, a $1,230 savings from the combined list price for the separate components.
- The P6001 Pronet-10 Starter Kit. It features all the hardware and software necessary to connect four IBM PCs on a Proteon 10M-bit token-ring network. Kit contents include four P1300 interface cards, a four-node wire center, Novell, Inc.'s Advanced Netware/86 for eight users, cables, connectors and documentation. It costs $3,500, a savings of $1,026 from list price.
- The P6002 Pronet-10 Turbo-286 Kit. It accommodates eight IBM PCs on Proteon's 10M-bit token-ring network and features the P1303 16-MHz PC AT interface, Novell's Advanced Netware/286, two four-node wire centers, seven P1300 Pronet-10 adapters, cables, connectors and documentation. The kit costs $7,500, a savings of $2,382.

Proteon also recently announced a development and OEM agreement with Encore Computer Corp. valued in excess of $3 million over two years. Encore manufactures Multimax parallel processing computer systems and Annex terminal servers.

Proteon reportedly will market terminal servers designed for the Pronet-4 and Pronet-10 networks as well as Ethernet Version 2 and IEEE 802.3 networks. The server utilizes Transmission Control Protocol/Internet Protocol (TCP/IP), fully integrating non-TCP/IP hosts and a variety of asynchronous equipment with TCP/IP computer resources on Pronet-4, Pronet-10, Ethernet and local-area networks.

The servers are available in 16- and 32-port versions. Sixteen-port server pricing is $7,995 for the Pronet-10, $6,000 for Ethernet networks and $8,295 for the Pronet-4, which is set for October availability. The 32-port, asynchronous version and 16-port server upgrades should be available in the fourth quarter, Proteon said.

Switch combines two technologies

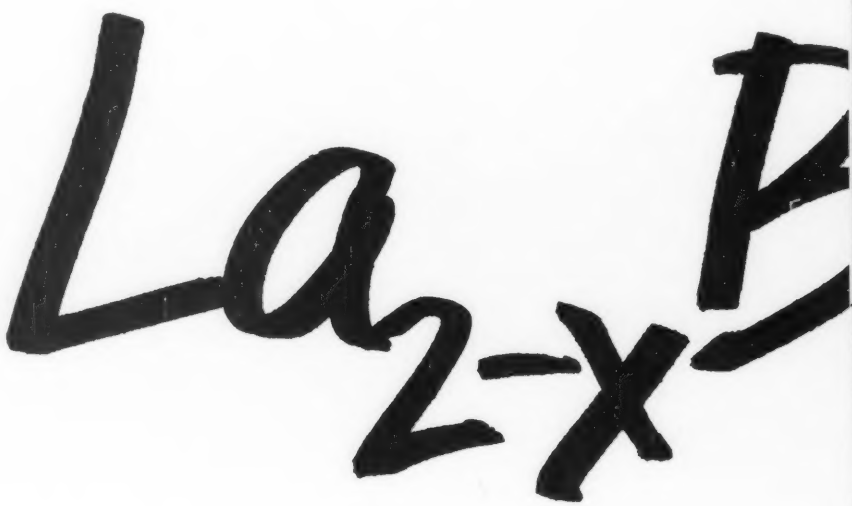
NEW ORLEANS — An integrated data and voice switch that combines both packet- and circuit-switching technologies for T1 network applications was rolled out by Codex Corp. at the recent 40th annual International Communications Association (ICA) conference.

The Codex 6290 Integrated Digital Exchange was developed by Stratacom, Inc. and is sold by Codex under agreement with Stratacom. It is said to transmit and switch information in packet format and also to support the high throughput and low delays necessary for voice, video and high-speed data. This means users can integrate voice, video, low-speed and emerging high-speed data applications over T1 facilities, Codex said.

The Codex 6290 supports 96 voice channels per T1 network at toll quality by compressing voice transmission and statistically multiplexing data transmission for optimal bandwidth utilization, the company said.

Set for availability in September, the $18,500 unit includes equipment redundancy with no points of failure and diagnostics that continuously monitor the operation of each channel on every link. Failed components are automatically identified through self-diagnosis.

In addition to the 6290, Codex will introduce products through 1989 that will include high-end switches, digital multiplexers and concentrators and lower and medium-speed digital networking products, said Mark Davies, vice-president and general manager of wide-area network products. The company reportedly will jointly research and develop these products with its parent company, Motorola, Inc.



This is the formula for something that looks ordinary, but does something extraordinary.

It is a superconductor, a material that carries electricity with no loss of power. Until recently, superconductors worked only at extremely low temperatures, limiting their use.

In a major breakthrough, two IBM scientists discovered that this class of materials superconducts at a much higher temperature, raising the possibility of expanding this technology's use.

Net-based diskless PC ships

SAN JOSE, Calif. — Santa Clara Systems, Inc. (SCS), a subsidiary of Novell, Inc., has begun volume shipments of PCterminal, a network-based diskless personal computer designed to address the need for low-cost network workstations.

The result of a joint venture announced in mid-1986 between SCS, Provo, Utah-based Novell and Hyundai Electronics in South Korea, PCterminal will be manufactured by Hyundai at a rate of more than 8,000 per month.

Novell instigated the partnership, while SCS did the initial design, an SCS spokeswoman said.

Priced at $699, the PCterminal is IBM Personal Computer-compatible and contains a built-in Ethernet high-speed interface. It features an Intel Corp. 8088 chip, an AT-style keyboard, 12-in. monochrome display, monochrome CRT controller, RS-232 serial interface, one parallel printer port, four expansion slots and 256K bytes of standard internal memory expandable to 640K bytes on the motherboard.

PCterminal is compatible with Novell's Netware network operating system. A proprietary network boot-programmable read-only memory allows the diskless workstation to autoboot DOS from a shared file server.

Packet switching

CONTINUED FROM PAGE 51

ification for credit cards, bisynchronous-to-bisynchronous service and call redirection, which allows customers to automatically forward calls to an alternate location.

Also at ICA '87, Telenet Communications Corp., a U.S. Sprint Communications Co. subsidiary, announced it had been awarded a data communications support contract from the Defense Communications Agency systems office.

The contract could potentially total $27 million if all options are exercised during the five-year contract period, according to Telenet.

Under the contract, Telenet's Federal Systems Engineering Consulting group will provide technical analysis and planning that includes the collection of operational and technical data on the Defense Data Network (DDN) user systems and assists in defining user interfaces for DDN's packet-switching network.

Telenet also announced it had been awarded a contract by United Technologies Corp. to design and install a 15-country private data communications network.

Telenet's TP3/II packet assembler/disassemblers will be used to link United Technologies' IBM SNA installations, as well as asynchronous terminals and hosts.

The terms of the contract were not disclosed.

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This discovery, by J. Georg Bednorz and K. Alex Müller, has sparked an explosion of research that could yield profound change. In fact, many think that if remaining obstacles can be overcome, superconductors could lead to major advances in many areas of human endeavor, including computers.

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Nets on the rise

CONTINUED FROM PAGE 51

ers, keeping control of their own networks is preferable to giving up some of that control to get more services, he said.

However, private T1 networks were more prevalent among those respondents who have current or planned ISDN installations, as compared with those who said they have no ISDN plans, the survey found (see chart page 51).

Half of the respondents have integrated voice and data; another 29% indicated they plan to implement it in the next year. Software-defined networks are in use by 19% of those surveyed, 32% said they plan to implement them and about half said they do not plan to implement them.

E-mail looms large

Five out of six surveyed said that electronic mail will be implemented in their companies within the next year, while three-quarters said voice mail will be installed. Meanwhile, video conferencing is emerging, with 22% of respondents currently using it and another 19% reporting that they plan to use video conferencing in the next year.

Both desktop publishing and electronic filing are in place at approximately 30% of the respondents' companies, while 56% said they do not have any plans for either application.

Some of the building blocks of networking are solidly in place and demand is waning, the survey indicated. More than 40% of the respondents currently use bypass technologies; only an additional 11% said they have bypass plans in the next year. These figures should serve as a tip-off that the bypass equipment market is slowing down, Rush said.

Only one-third of the respondents have worldwide networks, while 72% of those surveyed said they have domestic networking capabilities in place.

In a previous Coopers & Lybrand survey of chief executive officers, the key finding was that all national and international companies are being rapidly driven into international expansion, Rush said. But while the need for rapid access to international market information is critical to the chief executive officer, the telecommunications manager does not seem to be implementing the systems that would make that possible.

"It looks like the telecom manager is not privy to the business plan. He doesn't run in the same circles with the decision makers," Rush said.

Fast times

CONTINUED FROM PAGE 51

For years, data processing departments have developed and refined techniques and standards to ensure the integrity of production systems, but the emergence of LANs has been an unanticipated development.

Even assuming some level of hardware standardization within an organization (an assumption that is rarely appropriate today), software packages that audit, control and provide rollback and recovery mechanisms are simply not available.

Among the products that are beginning to provide these capabilities are IBM's Netview, its new component Netview/PC, IBM's LAN Manager and Cincom Systems, Inc.'s Netmaster. But use of these products may require that an unacceptable level of constraint be applied to the selected LAN software.

IBM's products, for example, are aimed at the IBM Token-Ring network, and it is uncertain how compatible even the "compatible" networks will be with those products. IBM tends to create a template — as it did with the Netview/PC Application Programming Interface — and leaves it to other vendors to create applications to conform to the template.

Nontechnical issues

There are nontechnical LAN management issues as well, and they relate to all good systems designs: backup and recovery procedures in physical terms, training of personnel for on-site diagnostics and error correction and notification procedures for support organizations.

In the traditional data processing areas, these issues have been thoroughly studied, and organizations and standards exist to ensure the functioning of systems with a minimum of failure-related disruption. When LANs enter the picture, however, the situation changes.

Some of the new issues relate to the availability of software notification when a problem occurs. For example, if a scheduled download cannot proceed because of a LAN failure, does central operations even know that a failure has occurred? The specific type of failure can be significant here because it may occur after notification of a successful download has been sent to the mainframe.

Of course, both success and failure alike have to be responded to, and today's network operations group may have no experience with LANs. Moreover, the site may be remote, local personnel may not be available, procedures for on-site recovery may not have even been considered . . . and the list goes on.

The distributed challenge

It is hardly good policy to create independent support units wherever a new distributed application is installed. One of the most significant challenges of the age of distributed processing will be the reconciliation of distributed architecture with centralized management.

This issue becomes most pressing with LANs but must be considered in geographically distributed systems communicating via CCITT X.25 protocols over public data networks, international systems using satellite links and even the stand-alone sites using dial-up lines.

Two distinct opportunities exist here: For data processing professionals, the chance to forge a new standard to ensure the integrity of enterprise-critical applications, and for vendors, the chance to bring to market the software that will make the management of the distributed computing resource possible. IBM is not likely to provide it any more than they provided good monitoring products 15 years ago, opening the way for vendors such as Boole & Babbage, Inc., Candle Corp. and Programart, a division of Computer System Architects, Inc., to carve out a new third-party market segment. History may repeat itself. Vendors: Are you listening?

Adrian is chairman of the micro-to-mainframe Special Interest Group of the New York PC Users Group and senior programmer/analyst at Shearson Lehman Brothers, Inc.

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BIT BLAST

Net links state capitol, districts

The California Legislature and **Digital Equipment Corp.** are just completing installation of a computer network that will link the state capitol with the district offices of 120 legislators.

The installation will reportedly incorporate computer and networking equipment valued at $8.4 million from DEC, including 130 Microvax IIs, All-In-1 office automation software, Decnet software and tools for document exchange with IBM mainframes.

The project is intended to automate the district offices and provide users with access to California legislative information systems. Users will also be able to exchange documents and messages and schedule meetings over the network.

3Com Corp. got its first 3Station local-area network workstations out the door on April 29 and was hoping to ship approximately 1,000 of them by the end of May, 3Com Senior Vice-President of Technology Robert Metcalfe said. Microsoft Corp.'s MS OS/2, Windows and LAN Manager reportedly worked successfully on the system during a test run.

NEW PRODUCTS

Local-area network hardware

The Plug Compatibles Group of **CIE Systems, Inc.**, a subsidiary of C. Itoh Electronics, Inc., has introduced a remote coaxial cluster controller called the **CIE 4071** that is said to support four to eight IBM 3270-compatible terminals, printers and other ASCII devices.

In addition to ASCII device support, the CIE 4071 offers support for downstream load devices and remote diagnostic capability. The controller communicates to the host via an RS-232 interface at speeds of up to 19.2K bit/sec. It supports both Systems Network Architecture/Synchronous Data Link Control and Binary Synchronous Communications modes. It includes 1M byte of memory, a 3½-in. system diskette drive and support for customized keyboards.

The CIE-4071 costs $3,995.

CIE Systems, 2515 McCabe Way, Irvine, Calif. 92714.

Local-area network software

Headlands Communications Corp. has announced **Add-a-Terminal** for PC-Talk4 communications software.

Add-a-Terminal is said to allow users to add any of 38 mini- and mainframe-terminal emulations to PC-Talk4. Each package provides full keyboard and display support and comes with a device driver, a setup program and a technical manual.

Add-a-Terminal is available for terminals from AT&T, Data General Corp., Digital Equipment Corp., Hewlett-Packard Co., Honeywell, Inc., IBM, Lear Siegler, Inc., Perkin-Elmer Corp., Televideo Systems, Inc., Texas Instruments, Inc. and Wyse Technology.

PC-Talk4 with one Add-a-Terminal package costs $129. Each additional Add-a-Terminal package costs $49.

Headlands, P.O. Box 8, 1624 Tiburon Blvd., Tiburon, Calif. 94902.

Customer-premise equipment

Aspect Telecommunications has announced the **Aspect Callcenter**, a stand-alone, digital automatic call distributor.

Designed to handle between 1,000 and 50,000 incoming calls per day, the Callcenter features an integrated voice-storage and voice-retrieval capability, a menu-driven user interface and customer development of call-handling routines. Call-handling capabilities include collecting and preprocessing caller identifications such as account numbers, ad-hoc caller-survey data collection and reporting and call-back message queuing.

Systems range in size to accommodate from 24 to 240 telephone agents and 24 to 288 trunks. Prices range from $135,000 to $1.1 million.

Aspect, 1733 Fox Drive, San Jose, Calif. 95131.

Lightspeed Technology, Inc. has announced the **Lightfax 96** interface card designed to turn IBM Personal Computers and compatibles into image communication systems as facsimile machines.

The Lightfax 96 is said to be capable of transmitting ASCII, graphics, or ASCII and graphics files directly from a PC. It can operate in the background and can automatically store incoming facsimiles.

Other features include an extra scanner port, the ability to store lists of telephone numbers and automatically dial them, intelligent data and voice-switching and compatibility with the Hewlett-Packard Co. Laserjet and other printers.

The Lightfax 96 costs $99.

Lightspeed, 8F-10, No. 746, Min Shen E. Road, Taipei 10580, Taiwan.

Protocol converters

Tekelec has introduced an **X.25 Packet Switch and Concentrator**, part of its Total Access Network System.

The X.25 Packet Switch and

Continued on page 58

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These true coaxial printers attach directly to a 3274/76 cluster controller or a 4331 Display Printer Adapter, without an external protocol converter. No behavior modification is required for them to work with PCs, either—both printers have parallel interfaces.

And no matter how you split their workload, these printers work like crazy. The CX3180 gives you draft text at 180 cps. The multimode CX3220 printer produces near-letter-quality text at 45 cps, and DP output at 220 cps. Both printers also generate high-resolution, dot-addressable graphics. And both are built for the kind of 100% duty cycle applications that make most printers crack under the strain.

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Continued from page 57

Concentrator is said to allow communications processors with four or eight additional ports to be added through a 10M bit/sec. system bus. The switch may be used separately as a local switch or as part of a complete network solution, the vendor said. Applications include low-speed to high-speed X.25 concentration, multiport switching, mixed-pad and switch configurations and protocol conversions with X.25 switch applications.

An eight port configuration is priced from $7,500.

Tekelec, 26540 Agoura Road, Calabasas, Calif. 91302.

Advanced Computer Communications has enhanced its **ACP 5250** and **ACP 6250** communication processors for the Digital Equipment Corp. Microvax and VAX, respectively.

The single-board, front-end processors are said to perform CCITT X.25 protocol processing in firmware on the board.

Enhancements to both boards include increased data packet size to 1,024 bytes, a facility that can pack up to 128 bytes of data in call setup and clearing packets and flow-control negotiation, according to the vendor.

The ACP 5250 data transmission speed has reportedly been increased to 300K bit/sec.

The ACP 5250 is priced at $4,200. The ACP 6250 costs $6,490.

Advanced Computer, 720 Santa Barbara St., Santa Barbara, Calif. 93101.

Modems/Multiplexers

Versitron, Inc. has introduced its **F9351** and **F9352** fiber-optic communications modules.

The modules are said to provide an optical link between Northern Telecom, Inc.'s SL-1 electronic telephone and its associated private branch exchange card. The link uses a dual fiber-optic cable pair to provide full-duplex operation up to 2 kilometers in distance. The Versitron link has an analog bandwidth of 300Hz to 3.5 KHz.

The F9351 and F9352 modules are priced from $1,145.

Versitron, 6310 Chillum Place N.W., Washington, D.C. 20011.

Network Software Associates, Inc. has introduced the **Adaptmodem 201/212** for IBM Personal Computers and compatibles.

The board-level modem, said to support both synchronous and asynchronous communications, incorporates a built-in Synchronous Data Link Control adapter.

The product plugs into any full-size expansion slot and functions at 2,400 bit/sec. in synchronous mode and at 300 or 1,200 bit/sec. in asynchronous mode, according to the vendor.

Adaptmodem 201/212 includes automatic call control software for synchronous applications, autodial, autoanswer, automatic redial, automatic phone line and modem-testing procedures capabilities and a call directory.

The Adaptmodem 201/212 costs $995.

Network Software Associates, 22982 Mill Creek, Laguna Hills, Calif. 92653.

Diagnostic equipment

Datacommunications Test Instruments has introduced the **DTI-8821 Link Analyzer** and the **DTI-8821 Automonitor.**

The Link Analyzer is a hand-held battery-operated analyzer for CCITT X.25 specific applications. It features a 64-char. display providing counts of total frame, total packets, total data packets, packet/sec. line utilization, sample times

The *DTI-8821 Link Analyzer*

and user-specified tests for data terminal equipment and data communications equipment simultaneously.

The Automonitor is said to automatically configure and monitor bisynchronous, Synchronous Data Link Control, Systems Network Architecture, high-level data link control and aysnchronous data links at rates to 72K bit/sec.

The Link Analyzer costs $799, and the Automonitor costs $1,995.

Datacommunications, 7666/1 Fullerton Road, Springfield, Va. 22153.

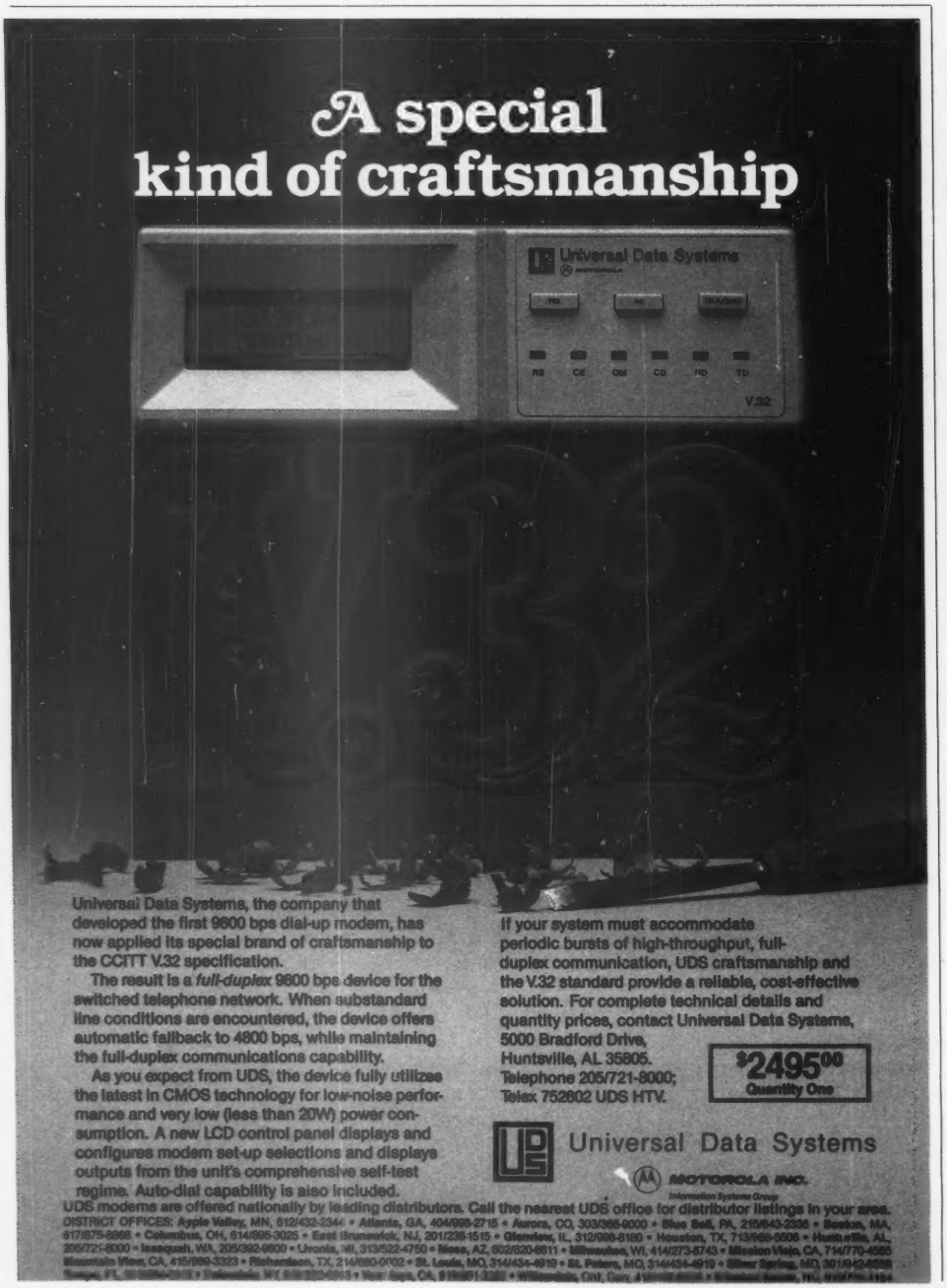
Cabling

Cable Management Systems, Inc. has introduced its **Star Patch Panel** designed for IBM System/34, 36 and 38 minicomputers using star-wiring topology.

The Star Patch Panel is said to allow the minicomputer hosts and peripheral devices to connect over IBM twisted-pair cabling in a star topology. It features eight inputs and 56 outputs, and it resides in the implementation of twisted-pair wiring of the entire patch/distribution system.

Th Star Patch Panel is priced at $595.

Cable Management, Suite F, 17955 Skypark Circle, Irvine, Calif. 92714.


A special kind of craftsmanship
Universal Data Systems
V.32
Universal Data Systems, the company that developed the first 9600 bps dial-up modem, has now applied its special brand of craftsmanship to the CCITT V.32 specification.
The result is a full-duplex 9600 bps device for the switched telephone network. When substandard line conditions are encountered, the device offers automatic fallback to 4800 bps, while maintaining the full-duplex communications capability.
As you expect from UDS, the device fully utilizes the latest in CMOS technology for low-noise performance and very low (less than 20W) power consumption. A new LCD control panel displays and configures modem set-up selections and displays outputs from the unit's comprehensive self-test regime. Auto-dial capability is also included.
If your system must accommodate periodic bursts of high-throughput, full-duplex communication, UDS craftsmanship and the V.32 standard provide a reliable, cost-effective solution. For complete technical details and quantity prices, contact Universal Data Systems, 5000 Bradford Drive, Huntsville, AL 35805. Telephone 205/721-8000; Telex 752802 UDS HTV.
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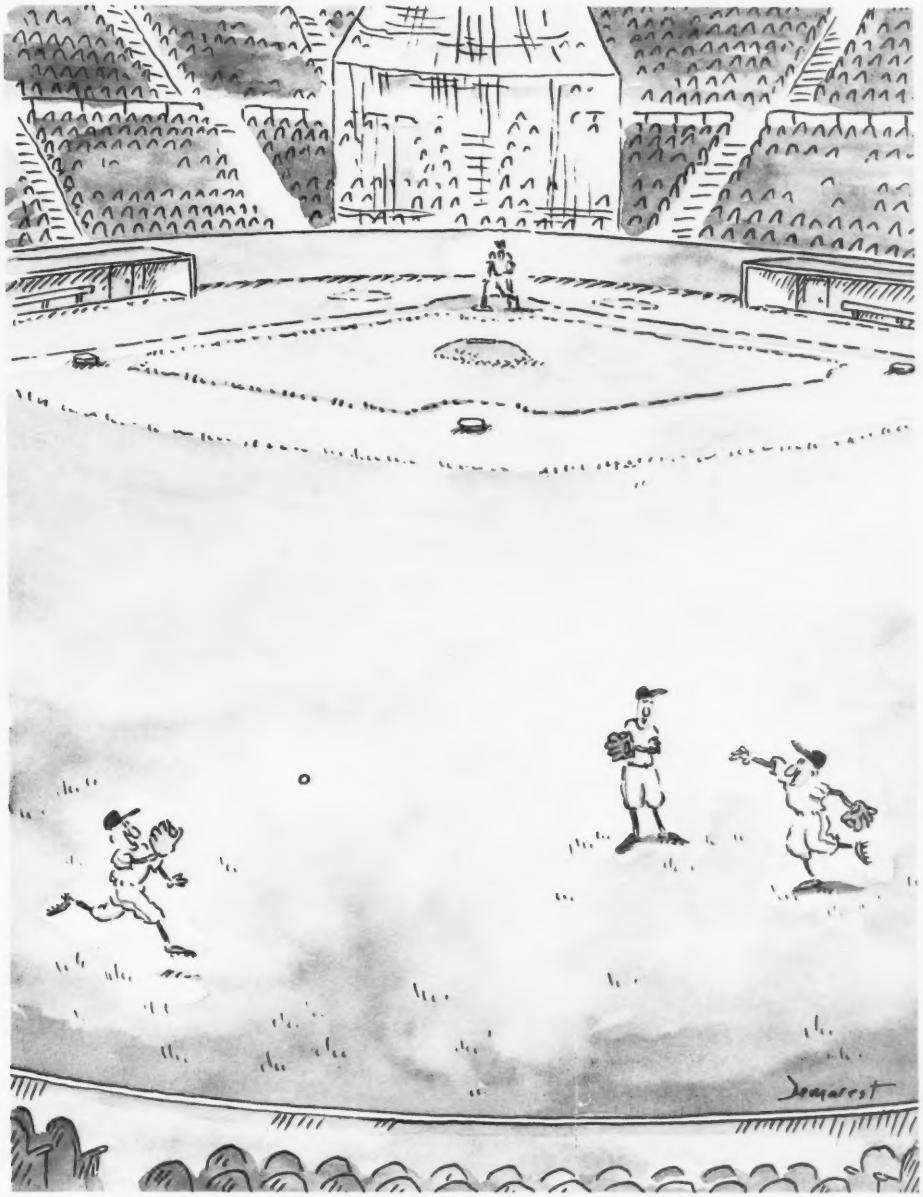
COMPUTERWORLD

SPOTLIGHT

LOCAL-AREA NETWORKS



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INSIDE

Soft-where?
LAN applications software is lagging far behind the rising tide of user demand. Page S2.

Network Countdown
Up-front planning allows a large N.Y. bank to cut back on-site network design time to eight hours. Page S13.

Vendor Viewpoints
Vendors must rally behind the ISO standard now or accept a forced solution from users later. Page S14.
When vendors do battle over standards, users emerge the victors. Page S15.

Risky Business
By selecting appropriate hardware, software, applications and procedures you can maximize LAN security. Page S18.

Gateways Gaining
LAN gateways have overcome early skepticism, bugs and performance problems to earn growing user acclaim. Page S20.

Fit to be Tied
Organizations of all sizes — and budgets — are finding local-area network solutions that meet their varied needs. Page S22.

Product Charts
A guide to local-area network servers, page S24; operating systems, page S25; and hardware, page S27.

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Sally Cusack
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Marjorie Magowan
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Bonnie MacKeil

Cover art: Chris Demarest

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LAN-based processing could provide championship teamwork, but application assists are needed to make that happen.

GOAL SHIFTS TO TEAMWORK

BY DAVID TERRIE

TOM HUNT

Death. Taxes. LANs. Like it or not, a local-area network is an inevitable part of your future. Despite a well-earned reputation for being as difficult to live with as taxes are to avoid, LANs are as integral a part of modern systems architecture as processors. If you have more than one intelligent device at your site, be they personal computers, minis or mainframes, you will eventually have a LAN. This is not a bold prediction; it is a fact.

Why a LAN instead of a private branch exchange (PBX) or some other technology? The answer lies in three characteristics particular to LANs: high bandwidth, distributed control and packet switching. High bandwidth is required because intelligent devices need to move large amounts of data quickly enough to be transparent to the user. Distributed control is needed to provide virtual (as in ad hoc or logical) connectivity on demand to users or applications — without burdening the systems on the network. Packet switching is needed for low-cost resource sharing and broadcasting to multiple destinations, such as distributed data bases.

These characteristics enable a local-area network to provide effective resource sharing. More important, they enable LANs to act as an extension of the internal buses of the attached systems, making it possible for systems to be built from physically dispersed building blocks of workstations, servers, disk storage devices and gateways in combinations transparent to users. No longer do files have to be located on the processor using them or users need to know which processor on the network is handling a job.

That the integral role of LANs in modern systems architecture is called into question at all is a manifestation of the chicken-or-the-egg syndrome. Ever since Ken Olson founded Digital Equipment Corp. and the age of distributed processing began, the industry has been busily chopping mainframes into smaller and smaller pieces. But the minicomputer did not change the fundamental time-shared, terminal-to-host architecture of these systems. Peer-to-peer communications were available in the early 1970s from DEC and Hewlett-Packard Co., but they were primarily for wide-area communications and not for end-user workstations. LANs were a decade away.

In 1981, with the advent of the now ubiquitous PC, IBM took the desktop computer out of the classroom and into the office. Unlike its forebears, however, the PC did not need to be attached to anything in order to be useful. This fact made the buying decision an easy one and resulted in the majority of these processors being used as stand-alone machines. At the same time, the PC has revealed just how ill-suited the time-shared architecture is to running productivity applications. Overnight, the departmental processor changed from a master to a server; a workstation from a slave to a client.

A client-server architecture brings new requirements for communications. Instead of characters, files and applications move between devices. This requires bandwidth. Further,

Terrie is president of Newport Consulting, a Boston-based consulting firm specializing in local-area networking and communications. He is affiliated with Patricia Seybold's Office Computing Group in which he publishes "Network Monitor," a monthly newsletter and market research service.

Teamwork

FROM PREVIOUS PAGE

networks with hundreds, even thousands more nodes than the early minicomputer networks need distributed access control to keep from being overwhelmed by communications processing. In addition, packet switching is needed to share bandwidth effectively and fairly among a large and diverse device population. In short, an architecture based on intelligent workstations demands a LAN for transport.

Basketball provides a good analogy to explain the power of LAN-based systems architectures. In basketball, every player fulfills a specific role — guards handle the ball and set the pace; forwards fill the lanes, shoot from inside or outside and help the center rebound and play defense; centers block shots and do the heavy work inside. Each player handles a role in accordance with his strengths and relies on teammates to handle roles he cannot perform well. Imagine how ineffective a team of one-on-one guards would be against a well-balanced team.

LANs offer the potential for a similarly well-balanced team to information systems, enabling a closely knit group of networked processors to cooperate, each handling the tasks for which it is best suited — thus the term "cooperative processing."

Unrealized potential

Although LANs have unlocked the possibility of cooperative processing among networked processors, few commercial and business applications have been written to tap that potential. What are offered are virtual disk facilities, which enable transparent access to remote disks with a virtual link. IBM's Enhanced Connectivity Services and DEC's VMS Services for Microsoft Corp.'s MS-DOS are typical examples of virtual disk facilities offered by minicomputer vendors. On PC LANs, most multiuser data base programs still run entirely on a user PC but access files on the server, on which MS-DOS 3.1 provides file locking, preventing users from simultaneously updating — and thus corrupting — a file. These are commonly referred to as "network-aware" applications.

Many vendors also use PCs as a front end for creating data base queries or electronic mail messages off-line and then sending them as a batch operation. Odesta Corp.'s Helix data base, for example, uses an Apple Computer, Inc. Macintosh to provide the user's logical view of the data base and for query construction. Queries are then processed on a server, either another Macintosh acting as a server or a DEC VAX running the VMS operating system, which sends back the answer when the job is complete.

BASKETBALL provides a good analogy to explain the power of LAN-based systems architectures.

This approach enables applications to take advantage of powerful data base servers without the heavy I/O burden usually associated with time-shared processing. In a PC LAN, a user of a PC based on Intel Corp.'s 8088 chip running MS-DOS 3.1 could thus take advantage of an Intel 80386-based server running IBM's OS/2, which taps the powerful protected mode.

A still more sophisticated model is one by technical workstation suppliers. Sun Microsystems, Inc.'s Network File System, which provides a machine- and operating-independent remote procedure call, is a de facto standard used by most of the Unix community, including DEC and HP. When combined with a windowing facility, it enables a user to open multiple active windows, each running an application on a different processor.

But even this virtual system capability does not change the way applications use processors; it just uses the network to provide flexible access to them from a single workstation.

Distributed Data Manager

In part because of IBM's concern with the difficulty of writing programs that assign subroutines to different processors, the company's Distributed Data Manager (DDM) takes a typically conservative approach to networked applications. DDM is a new Systems Network Architecture (SNA) base that provides a network-transparent programming interface, enabling new applications to be written as though all files were local.

Instead of splitting the program code, DDM traps calls for data that are not on the local machine and forwards them to the remote machine with the needed file. However, the data used by an application can be split up on more than one processor.

With the exception of the PC, record-level access is provided on remote systems, eliminating the need to transfer whole files when an application needs only selected records. In this sense, DDM is like Microsoft's Redirector, which is licensed by most PC LAN software suppliers. Another benefit is that direct-access storage devices can be managed more flexibly, since DDM shields applications from having to know where the file is stored.

There is another, equally important, aspect of networked applications that DDM addresses: distributed data base synchronization. In a distributed data base, multiple remote portions must be updated simultaneously to keep the data base synchronized. If one of the links to a remote distributed data base goes down during an update, a user ends up with a corrupted data base. Addressing the issue with DDM not only removes considerable overhead from the processors on the network; it makes the application developer's job much easier.

If DDM has one drawback that will slow its acceptance for remote, multivendor file access, it is that the directories of

Continued on page S6

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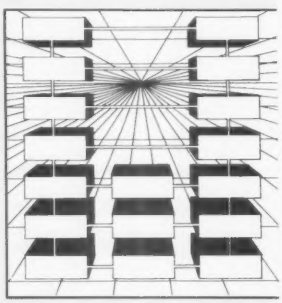

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PC LANs stalled at software stoplight

BY AARON BRENNER

The microcomputer industry struggles with a persistent problem — software lag. Sophisticated hardware is introduced and languishes until software capable of activating its potential appears.

The personal computer local-area network (LAN) market is currently stalled at this familiar intersection.

LANs are now well developed and adequately standardized. Ethernet and token-ring are today's two standards of choice, claiming such dominance that Vince Barret of the Gartner Group, Inc., a market research company based in Stamford, Conn., predicts the two will evenly split 90% of the LAN shipments in 1990.

Products like IBM's PC Local-Area Network Program, Novell, Inc.'s Advanced Netware and 3Com Corp.'s 3+ have brought some stability and consistency to the LAN market by giving users a solid operating system platform on which to base a network.

Software developers, in the meantime, have found their footing with IBM's Netbios. This applications interface to the network provides a dependable and broad-based foundation from which to construct products that will run on many different networks. These developments have not, however, produced the kind of surge in LAN applications software that will propel LAN usage to new highs.

Not flying so high

Most advances have come in the areas of multiuser data base management systems and electronic mail for LANs. But these have been limited to smaller vendors and small sales. "There are some good general-purpose LAN applications products," says Lee Doyle, LAN market analyst at Framingham, Mass.-based International Data Corp., "but not the real blockbusters that would drive LAN sales."

In fact, the opposite is true. Instead of users buying hardware on which to run existing software, the rapid implementation of LANs is compelling small and medium-size software makers to develop applications software for the new market. But the results are ambiguous at best.

With demand rising as users realize that LAN possibilities go much further than peripheral sharing and electronic mail, the supply of LAN software lags behind not only demand but behind rising user expectations. The applications software that does exist is just not powerful enough or tailored well enough for LANs.

As Daniel Gross of Magnetic Press, a research and information-gathering firm based in New York, puts it, "Right now, a lot of applications are becoming network compatible, especially data base management systems, but that doesn't mean anything exciting, except file locking, which isn't very exciting."

For users, this means the applications software that does exist is not sufficient to justify purchasing a LAN.

Bill Drummy, head of technical products at Sumware, Inc. in Laguna Hills, Calif., which offers a work group scheduler that runs on LANs, summarizes the problem. "We became interested in networks three years ago, but, back then, it was too little, too soon," he says.

OS/2 to break gridlock?

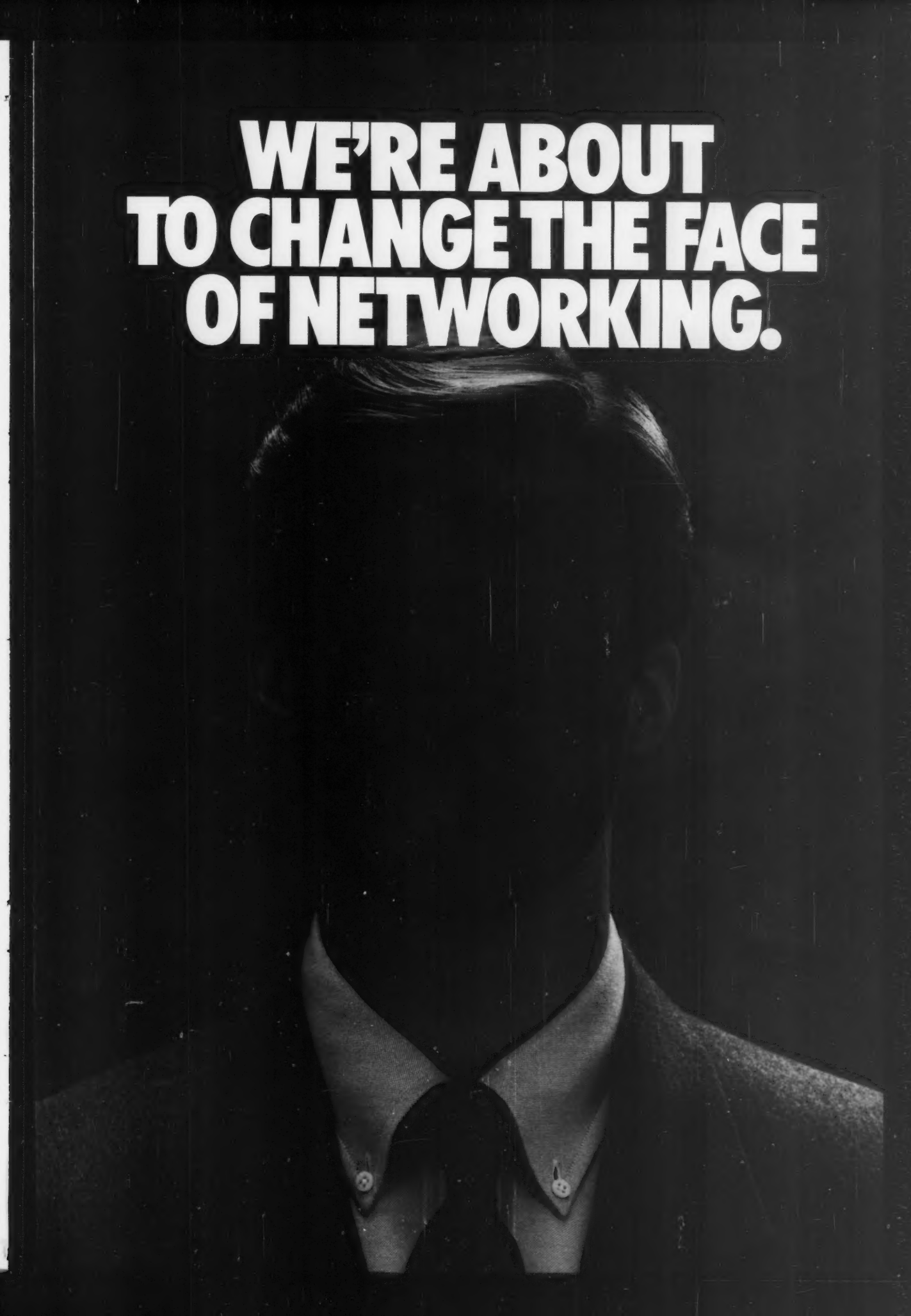
Clearly, the LAN industry needs much more applications software to make it fly. At the same time, the applications vendors need a market in order to justify development.

According to Gross, what will break this deadlock is OS/2, IBM's operating system for its Intel Corp. 80286- and 80386-based Personal System/2 machines. OS/2 will have the hooks that MS-DOS lacks to handle heavy transaction-oriented applications on distributed PCs.

Ashton-Tate, Lotus Development Corp. and Microsoft all seem to be waiting for OS/2 before they invest any resources in new LAN applications software.

"As multiuser possibilities become a reality, we certainly want to keep up," says Dave Micek, Dbase product manager for Ashton-Tate. "Of course, there are limitations to the multiuser capabilities within DOS, but those should be taken care of with the new OS/2 — better standardization and better use of the operating system to control file and record locking."

Brenner is editor of *LAN Magazine* in New York, a publication devoted to LAN products and peripherals.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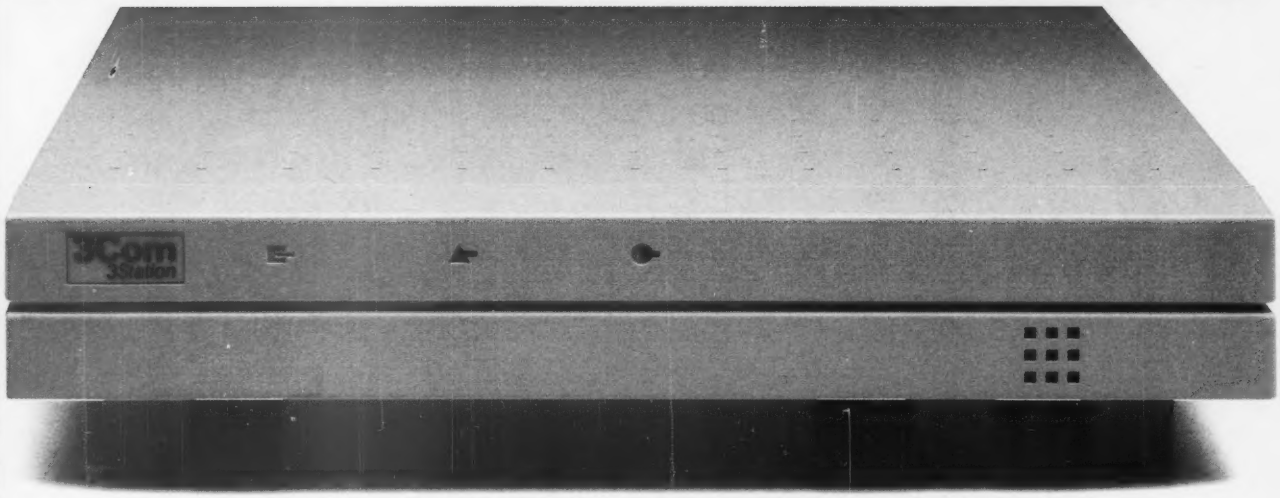

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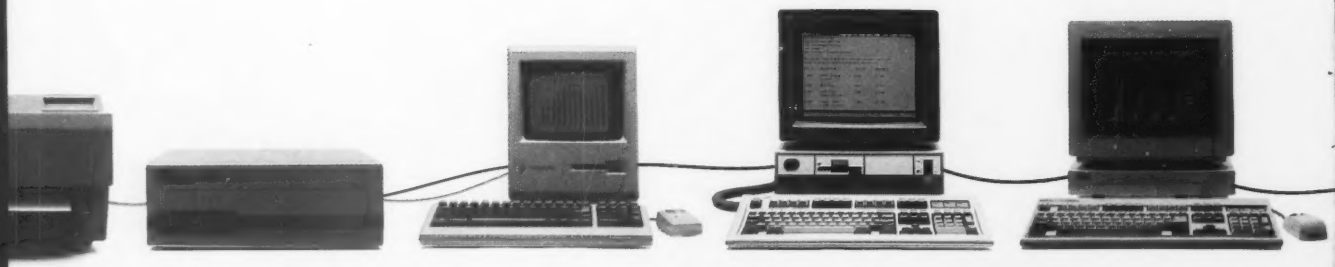

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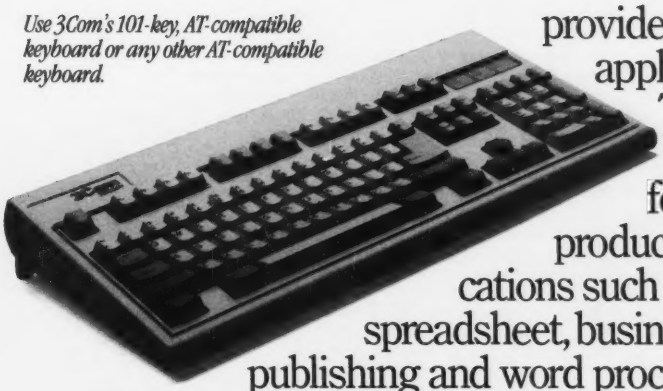

provide up to 35% more memory for your applications than adapted PCs. This makes 3Station the optimized workstation for business productivity applications such as database, spreadsheet, business graphics, publishing and word processing.

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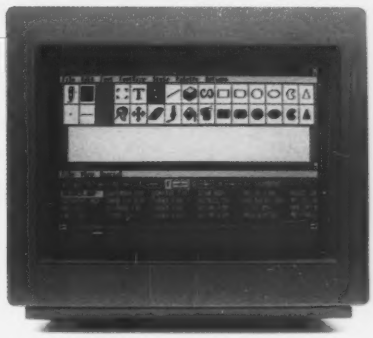
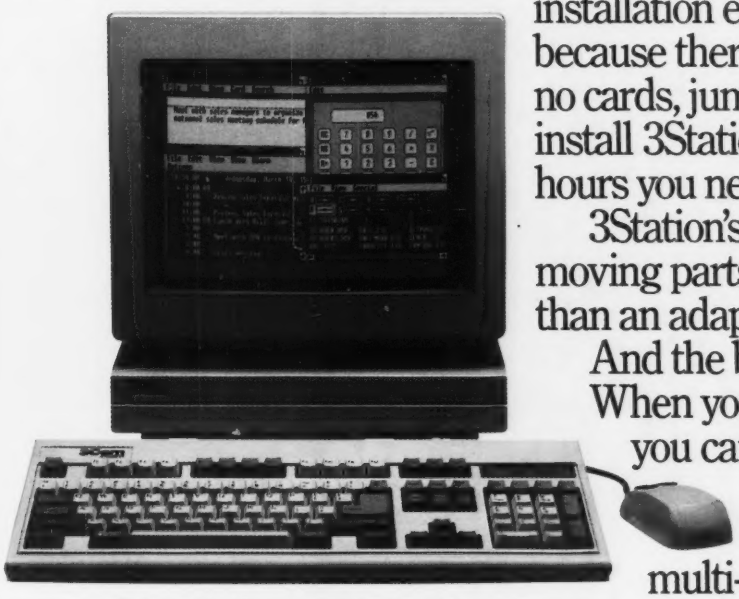


You can use EGA, CGA or monochrome (including Hercules), monitors with 3Station.



3Station is ideal for memory-intensive applications.

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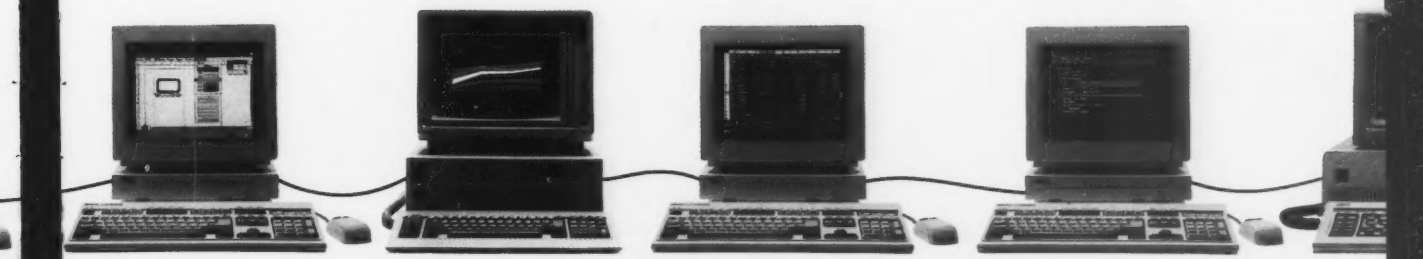

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Teamwork

FROM PAGE 2

remote files must be manually maintained on each node. This lack of a global directory capability is an administrator's nightmare, and IBM must address it before DDM becomes an industrywide standard.

IBM's OS/2 Extended

Little noticed amid the hubbub of communications and data base enhancements in IBM's OS/2 Extended Edition is a facility called Commit/Rollback. If an update to a data base is completed, the operating system will issue a Commit statement; if not, a Rollback statement will be issued. When a system or server is restarted after a failure, the data base manager will automatically back out any incomplete transactions. File recovery utilities of the type provided by the popular Norton's Utilities package will also be available to help recover lost data. This is the non-SNA version of the kind of protection DDM is designed to provide.

One facility to look for in future releases of OS/2 Extended Edition is a Retry capability that will attempt to complete transactions when equipment failures have been corrected. Novell, Inc. is already providing the same capability via the transaction tracking system in the system fault-tolerant version of its Netware LAN operating system.

An important accompaniment to OS/2 is Microsoft's LAN Manager. The LAN Manager's chief attribute, other than its resting spot on top of OS/2, is that it supports truly distributed applications of the kind previously found largely in technical environments.

One thing that Microsoft has not explicitly stated but that we fully expect to happen is that this central data base will often be something other than a PC running OS/2. DEC might, for example, use the LAN Manager to write distributed applications using a VAX running the VMS operating system as the server. This is precisely what IBM intends to do with the OS/2 Extended Edition Communications Manager facilities. But dividing applications into workstation-resident front ends and server-resident back ends also make sense for users with networks mixing MS-DOS and OS/2. An 8088-based PC running MS-DOS 3.1 would be able to take advantage of a 386-based server running OS/2 to process queries in a fraction of the time it would take locally. Xenix systems will also be able to communicate with the OS/2 LAN Manager.

The cluster concept

DEC first popularized the now common catchphrase, "the network is the system." While it makes a nice marketing concept, the phrase does not adequately describe what advanced networking brings to a systems architecture from a strategic standpoint.

For an ironmonger in this age of commodity-priced 32-bit silicon chips, an advanced network architecture enables a vendor to enhance the effective price/performance of its boxes by making the network's sum greater than its processor parts. For DEC in particular, this means not having to maneuver in the middle of a crowd.

The tactic that DEC is using to separate itself from competitors is its Local-Area Cluster (LAC). LAC provides three advantages for DEC: increased throughput, load leveling and centralized resource management. These attributes provide clusters with the processing power of tightly coupled CPUs (of the kind used in IBM's mainframes), combined with the geographic dispersion and robustness of a LAN. Moreover, existing applications can take advantage of LAC without being rewritten.

DEC's clusters have a single "boot member," which stores a single copy of the operating system and all applications used on the network. When a processor is powered up, the boot member downloads a copy of the operating system and the required applications. In addition, it coordinates file and record locking for all processors on the network. Unlike a PC LAN server, which also coordinates record and file locks, the user workstations, or satellite members of a cluster, do not possess their own filing systems but rather share a single logical view of all network resources.

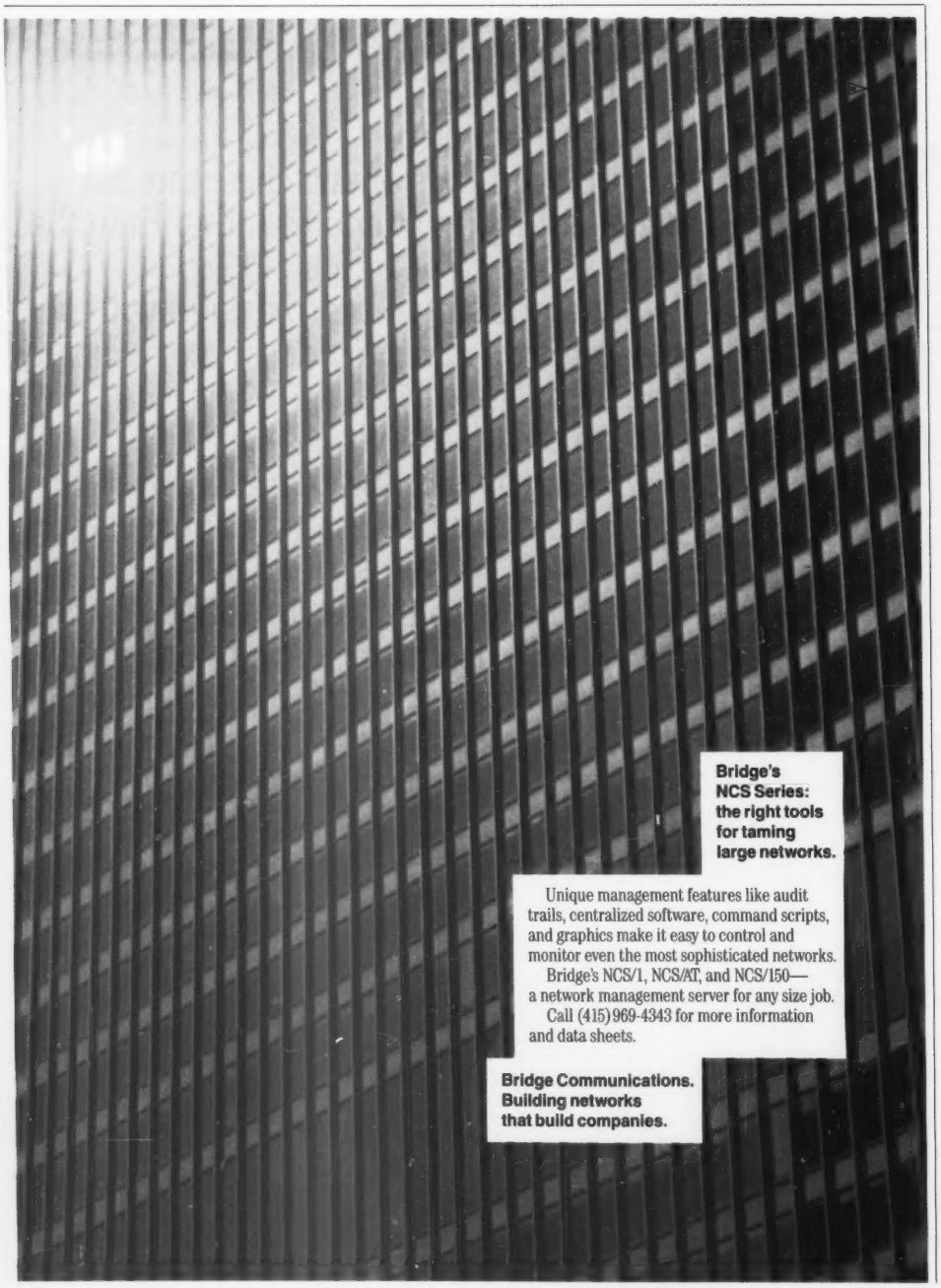
Clusters also employ load leveling, an important feature of logically integrated networked processors and the computer systems equivalent of a taxi dispatcher. To achieve this load leveling, and the necessary coordination of network resource requests, DEC employs a VMS operating system module called the Distributed Lock Manager.

DEC sees two types of clusters being configured: homogeneous clusters, in which all members are identically configured, and heterogeneous clusters, in which members are configured for specific applications.

As with IBM's DDM, OS/2 Extended Edition and Novell's Netware, future releases of LAC software will include a records management system, which keeps a journal of record changes and rolls them back to the last point of integrity in the event of a failure. In addition, a Retry feature called checkpoint/restart will automatically restart applications on a different processor from the last point of integrity.

Launch of a program

The most advanced concept in network-optimized application programming is Apollo Computer, Inc.'s Network Computing System (NCS), announced in February. NCS takes the concept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of cooperative processing to its logical extreme by enabling subroutines from applications to be dynamically assigned to various processors, depending on their current processing load and inherent capabilities. NCS, which Apollo is proposing as an industry standard has four elements:

- Remote procedure call, which applications can use to reach out across the network.
- Network Interface Definition Language (NIDL), which provides programmers with a high-level language for specifying remote computing requirements.
- A C-language source code compiler for NIDL, enabling recompilation for any target system.
- A software tool called a Location Broker, which monitors available computing resources and dynamically assigns subroutines to the best candidate.

To illustrate what an NCS application might be like, Apollo uses the example of a financial analysis application, which would be able to pull data from several different data bases and assign computer-intensive routines to a Cray Research, Inc. supercomputer, and decision-making algorithms using artificial intelligence to a Texas Instruments, Inc. Explorer.

There is a catch to the kind of power and flexibility that Apollo's NCS provides. It places a considerable burden on the programmer, who must specify which processor or type of processor the Location Broker can assign to run every subroutine. This naturally requires that structured-programming techniques be used. Moreover, factors such as the mix of vendors, the particular configuration of those systems and the load currently being placed on those systems at customer sites are unpredictable and will make it difficult to write generic applications. The saving grace is that the C language source code's portability will enable programmers to build in a number of possible candidates for each subroutine.

Another permutation that must be worked into an NCS application is that the Location Broker must be configured with the percentage of cycles an NCS application can use for every available processor.

NCS will require considerable sophistication on the part of the user, since both the applications and the systems on the users' network will require fine-tuning for optimal performance. Nevertheless, NCS is garnering considerable interest and is likely to be widely licensed in the technical community.

Cable conundrums

Although LANs are becoming a truly integral part of a state-of-the-art system architecture, their geographic dispersion, often separate buying decisions and sheer multitude of options has made implementing them an uncertain process.

Until quite recently, one of the most frustrating aspects of planning for LAN installations was that each LAN employed different cables and connectors. Ethernet used thin or thick coaxial cables, token-ring networks used shielded twisted-pair wires, and broadband networks used broadband coaxials. Furthermore, the topologies were completely different. All this made it impossible for users faced with rewiring buildings to effectively plan for all contingencies.

THERE have been some bungled attempts at standardization. IBM's Cabling System, in its original form, was a horror show.

There have been some bungled attempts at standardization. IBM's Cabling System, in its original form, was a horror show of fat, expensive cables and space-wasting closet hardware. Conceptually, IBM was right, but large-scale, bus-oriented LANs (primarily Ethernet) made cable management and trouble-shooting difficult.

IBM has since introduced several new cables, including unshielded twisted-pair wiring — on which IBM initially said its Token-Ring network could not run — and new, more compact closet hardware that makes the Cabling System a much more attractive option.

DEC followed suit with its Decconnect system, which provided a similar wiring-closet-based formal cabling system for Ethernet, its LAN of choice.

In Decconnect RJ-58, thin coaxial cable is distributed to wall plates and connected in the wiring closet via multiport repeaters to form a physical star configuration. With the Ethernet cable and standard Cheapernet BNC connector outlet, Decconnect wall plates have an RJ-11 telephone jack, an RS-423 data jack and a broadband coaxial outlet.

Although Decconnect is intended to be used as an Ethernet-only cable plant, some users have found a way around this. Apparently, it is possible to plug an RJ-11 jack into the RS-423 outlet, a tactic some Phonenet (a modified version of Apple's Appletalk from Farallon Computing) users have employed. If this connection works for Appletalk, it may work for Starlan and token-ring networks as well.

Both of these cabling systems are destined to play a shrinking role in the marketplace, however, because it is now clear that unshielded twisted-pair wiring will, in the short term, support Ethernet's 10M bit/sec. data rate. 3Com Corp., HP, Synoptics, Inc. (a Xerox Corp. spin-off), AT&T (which is working with Synoptics) and DEC are all working on this, along with traditional coaxial elimination outfits like MUX Lab, Inc.

Because of this, the smart move for anyone planning to rewire a building is to use an AT&T PDS-compatible wiring scheme while paying particular attention to minimizing the length of the wire between wiring closets and wall plates. There is no standard distance yet, although 3Com will be proposing one to the committee on IEEE 802.3.

Although this committee does not deal directly with the IEEE 802.5 committee — which handles token-ring standards — it is a sure bet that the two committees will make sure that whatever is specified will be applicable to both LANs. Once this is done, users will finally have available what has been needed for years: a generic cabling system that separates the wiring decision from the type of LAN being used.

As for using existing wiring plants, this will be a hit-or-miss proposition, since the current run lengths, cable qualities and interference levels may not be up to the new specifications. Even though it is possible to reconfigure a cable plant by separating data pairs and punching them down on separate punch blocks located to meet distance specifications, the labor cost and sheer administrative nightmare may lead many users to simply pull new pairs for LAN use.

Although it has kept a low profile, the IEEE 802 Ad Hoc Study Group on Integrated Voice and Data (IVD) LAN Solutions has been shaping the future of voice/data LANs since early 1986. The basic objective is to combine Integrated Services Digital Network (ISDN) and IEEE LAN functionality to provide a single low-cost transport for voice and data, a standard that it informally calls the ISDN MAC, or Media Access Control.

IBM, DEC, HP, Bell Northern Research/Northern Telecom, Inc. and AT&T, as well as the European heavyweights Siemens AG and British Telecommunications PLC, are among 23 companies that have attended the LAN study group meetings.

The IEEE 802.9 IVD LAN standard will work with all existing IEEE LANs, including 802.3, 802.4, 802.5 and Fiber Data Distributed Interface, as well as in a full-fledged integrated voice/data LAN environment, with the IVD LAN providing the transport for all voice and data traffic between user devices and systems or PBXs.

The committee is considering a number of similar channel options. The proposals of current interest are for aggregate bandwidths — voice, circuit-switched data and packetized data — of 1.544M bit/sec. (the domestic T1 rate), 2.56M bit/sec. (used by Northern Telecom's Lanstar) and 2.048M bit/sec. (the European T1 rate). The current preference is for the latter data rate.

Although voice/data integration has been a disappointment to its proponents, the IVD LAN standard will fulfill many 5-year-old predictions of a boom market. When the standard is completed in the 1989-to-1990 time frame, it will be universally adopted by PBX and end-user device suppliers, providing the industry-standard communications platform local voice and data integration needs to become a mainstream technology.

Endangered species

This short list of sure survivors among LAN technologies portends a long list of endangered species. Nonstandard LANs will need either a large installed base or a distinct price/performance advantage to avoid a quick death. IBM's new baseband PC Network is likely to have a short life. LANs such as Datapoint Corp.'s ARC and Corvus Systems, Inc.'s Omninet will last longer by dint of their large installed bases, and IBM's broadband PC Network will be sustained for a time by its large broadband cable plants.

IN SHORT, IBM customers will lean toward the token-ring network, while the rest of the industry will tend to choose Ethernet and Starlan.

Wang Laboratories, Inc., Sytek, Inc. and Network Systems Corp. are all cognizant of the technological imperative and are busy migrating their product lines and installed bases to industry standards.

In what will eventually be a commodity-type market, many vendors will end up as value-added resellers. Although LAN adapters are not yet sold via mail order channels, there is no reason to believe they will not be.

At the low end, LANs will have to be priced much lower than Starlan, which is now selling for $300 per node and dropping fast.

Among those that will survive is Apple's Appletalk, simply because, at $50 a node, it is so remarkably inexpensive. Software LANs that come in at less than $100 per node will also have some niche appeal for basic resource sharing purposes.

Those LANs, such as Arcnet, which probably offer marginally better performance than Starlan, will run smack into Ethernet, which has plummeted to the $400-to-$500 price range for PC boards since the beginning of the year. Token-ring network adapters are currently priced in the $650-to-$1,000 range, being earlier in their life cycle than Ethernet, but will eventually narrow this gap.

Since the difference to users of these LANs is more subjective than real, the choice between the two is most likely to depend on the vendor selling the rest of the system. In short, IBM customers will lean toward the token-ring network, while the rest of the industry will tend to choose Ethernet and Starlan.

At the high end of the LAN spectrum, the ANSI Fiber Data Distributed Interface (FDDI) standard, a high-throughput, 100M bit/sec. token-ring, will take over in the next two years. Already, technical workstation vendors are beginning to use early implementations (such as Proteon, Inc.'s Pronet 80) with their high-end systems.

Performance issues

With the prospect of 32-bit PCs proliferating in the office, the issue of potential throughput for various LANs is of concern to users planning for the long term. Currently, PC buses and disk I/O technology are fairly sluggish compared with the speed of processors on 286- and 386-based PCs. For 16-bit 286-based PCs, IBM's Micro Channel will have minimal impact. But for 386-based PCs, the 32-bit capacity of the Micro Channel should result in considerable thoughput improvement, although benchmark tests have yet to be done.

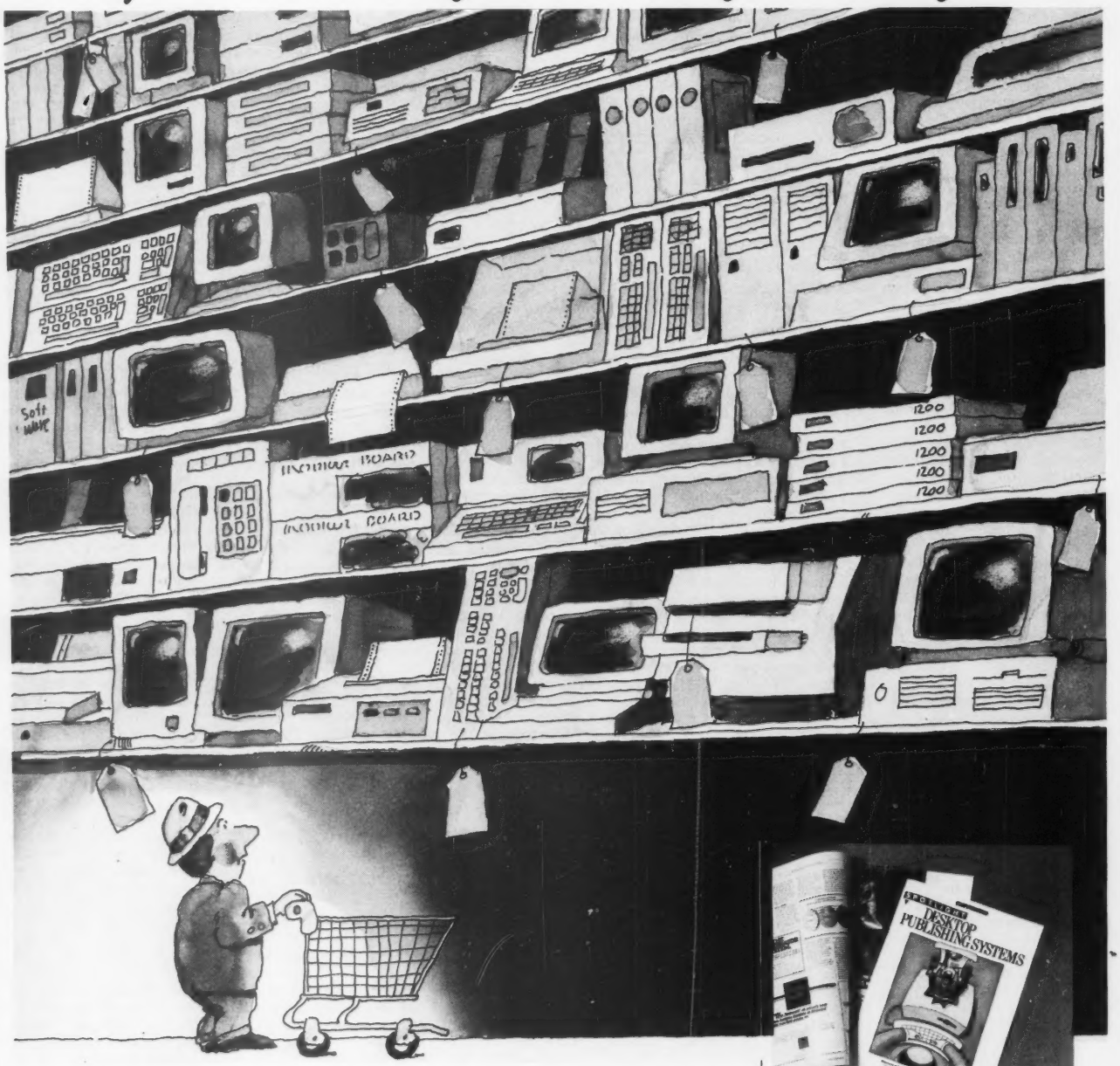
Network software, which is a limiting factor in throughput, can be expected to improve with every new release. Servers will be the primary beneficiaries of improved system-bus I/O. As for disk I/O, better techniques for caching (temporarily storing data in high-speed random-access memory), high-performance disk controllers and generally faster average seek times on server disks will help improve throughput.

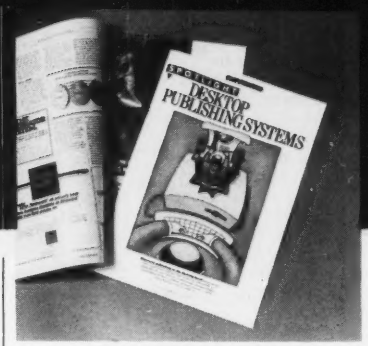
As PC LAN throughput becomes less device- and software-dependent, the potential performance ceiling for various LAN technologies will become more of a factor. In particular, the potential of Starlan relative to Ethernet or the token-ring is of concern for many users.

HP, the first minicomputer vendor to employ Starlan as its primary office workstation LAN, says its tests show little throughput difference between Ethernet and Starlan when reading a Lotus Development Corp. 1-2-3 file. This is true for networks

Continued on page S9

Reach potential customers just as they're ready to buy.





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Upcoming SPOTLIGHT Issues

Issue	Topic	Ad Closing Date
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July 27	Graphics Workstations & Software	July 10
Aug. 3	Communications Software	July 17
Aug. 10	DBMS for Large & Medium Scale Systems	July 24
Aug. 17	Field Service	July 31
Aug. 24	Education & Training	Aug. 7
Aug. 31	DBMS for Micros & Small Systems	Aug. 14
Sept. 14	DB2 Market	Aug. 28
Sept. 21	Hardware Roundup: Large & Medium Scale Systems	Sept. 4

Teamwork

FROM PAGE S7

using an HP 3000 mini or a PC as the server. As for the number of supportable users on Starlan, HP says it believes that the infrequent use of LAN resources during the day will enable it to support up to 50 users per subnet.

Although the improvements in device I/O and network software are bound to widen the performance gap between Starlan and Ethernet or the token-ring, the impact perceptible to users will be small, and Starlan will persist as a popular choice, due to the roughly 2-to-1 cost advantage it will continue to enjoy over Ethernet.

Vendors to watch

Among the independent PC LAN vendors, 3Com, Novell and Banyan Systems, Inc. are all thriving and will continue to enjoy good health, barring any self-inflicted wounds. A key issue for Novell and Banyan will be how well they are able to incorporate Microsoft's new OS/2-based LAN Manager, which is tightly integrated with OS/2, into their proprietary network operating systems.

Another player likely to play a strong role is Western Digital Corp., which is now offering a full-line solution of PC cards, servers and software, either its own or Novell's Netware, and is using its low-cost manufacturing capability to offer Ethernet boards for $400 and Starlan boards for $300. AST Research, Inc. is also offering Starlan boards in the $300 price range. It is also likely that a redirected AT&T will play a larger role than its current lack of success indicates.

A wild card in this pack is Microsoft, which clearly views this market as a lucrative opportunity but must balance any direct assault against its OEM business.

As a group, these vendors possess a fairly sheltered niche. The larger systems vendors must, as a matter of strategy, optimize their offerings around proprietary solutions and so are not likely to build powerful PC-architecture servers that work against this natural self-interest.

PC LAN vendors actually sell into two fairly distinct environments, regardless of the channel used. The first environment, and the one in which they will enjoy continuing success, is at sites or businesses not already committed to any proprietary technology and at which the PC LAN would represent the only shared system. These sites will be attempting to leverage their PC hardware and application investment in as cost-effective a manner as possible and require little in the way of sophisticated internet capabilities such as gateways to other vendors' networks and mail systems. As a consequence, lesser known but solid network software will be able to compete for this business with the high-profile PC LAN environments.

The second market is the traditional corporate turf for minicomputer vendors, including IBM. These sites will often have an existing commitment not only to a proprietary processor and office system but to the vendor's proprietary network architecture as well. Selling into this market effectively will require a high level of connectivity to other vendors, the primary targets being DEC, IBM and the International Standards Organization (ISO), with its X.400.

Although LAN hardware options are coming into focus, network protocols and programming interfaces are still evolving rapidly. Application developers have only begun to use networks to turbocharge the processors on them.

THE ACID TEST that purchasers should use is to ask themselves the question, "Does this product make my life easier?"

Work left to be done

A considerable amount of work remains to be done on upper layer network standards and programming interfaces, both ISO's and de facto interfaces, which must be completed before distributed system architectures displace the tried-and-true time-shared minicomputer or the PC LAN-based applications so heavily relied on today.

For the remainder of the decade, the bulk of end-user computing will be satisfied by PC-resident productivity applications and simple data sharing. Moreover, the impact on the housekeeping chores of network administration and management should be the first thing considered when evaluating new distributed application environments.

The acid test that purchasers should use is to ask themselves the question, "Does this product make my life easier?" It is fair to say that Microsoft's LAN Manager and DEC's LAC pass the test, while IBM's DDM and Apollo's NCS do not. Manual directory maintenance requirements fail the former; demands placed on programmers fail the latter. As a result, distributed applications of the sort Apollo is proposing with NCS will initially be practical only in technical environments and data centers.

The only sensible course of action for the moment is to find a comfortable spot on the evolution curve, and do your best to keep your options open. ●

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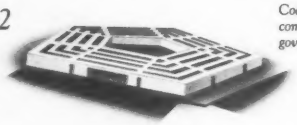

Codex develops its first data communications product for secure government applications.

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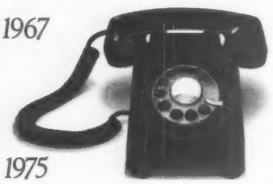

Codex announces the first commercial 9600 bps modem. In 1976, our technology is adopted as the international standard by the worldwide CCITT committee.

1975

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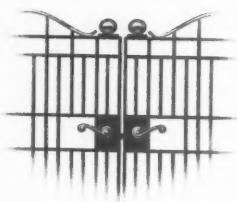
1984



Codex introduces breakthrough technology and architecture that transforms its new generation of high speed modems into a "network systems resource." In 1986, the first software option – a complete communications test package – is announced.

1985

Codex introduces gateways that allow separate networks to be combined.

1985

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Codex combines multipoint modem and multiplexer technology to allow independent applications – using different protocols – to share the same communications line.

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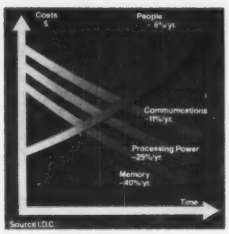

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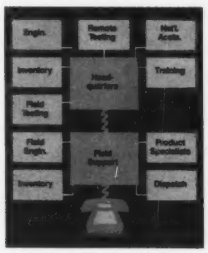
In addition to all this, we back our solutions with a wide breadth of reliable networking products. Our history of



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The result? A productive, efficient network.

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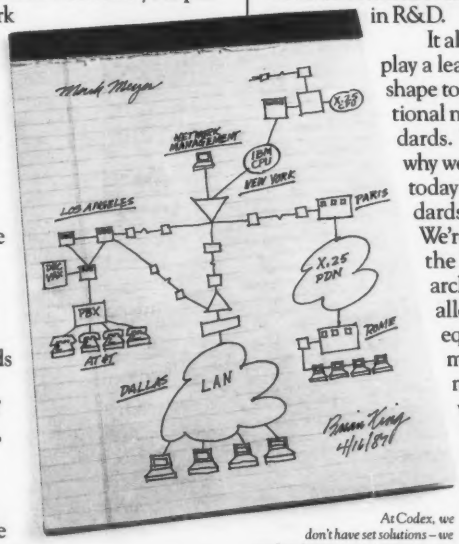

At Codex, we don't have set solutions – we work with your current environment. Which is why we spend a lot of time drawing diagrams like this.

If you're planning on business growth, your network company should be planning on growth, too.

Of course, there's more than compatibility to consider. Since your network is a major investment in the future of your business, one of our highest priorities is to ensure that your investment is protected.

The best way to do that is to design a network solution capable of accommodating growth. Better yet, we design our networks so that they can actually spark growth within your company – helping to drive it by being a vital and powerful corporate resource.

Of course, this demands an enormous investment of time and money in R&D.

It also requires us to play a leading role to help shape tomorrow's international networking standards. Which explains why we're so active on today's industry standards committees.

We're helping to create the kind of "open architecture" that will allow you to link equipment from many vendors in a more productive way. And will help us further accommodate your company's future growth.

With that kind of support, your network will be able to grow by leaps and bounds. And your business along with it.

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Codex is currently working with 97% of the Fortune 100. And the experience we've gained from those associations and others can be put to work just as successfully for your organization.

In fact, in a recent *Data Communications* survey, many of these and other companies consistently ranked Codex first as the networking vendor they preferred in categories ranging from best price/performance to technology to customer support.

And of course, besides working for successful companies, we're also backed by a successful company – Motorola.

How can you find out what Codex can do for *your* applications?

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Designing LANs for tomorrow's systems

A recent development in personal computer-based networking with long-term implications is Microsoft Corp.'s announcement of its LAN Manager for local-area networks. The LAN Manager is an application that runs on top of IBM's OS/2 and provides file and printer sharing, security features and network administration tools.

That description may sound routine, but the true potential of the LAN Manager comes from its tight integration with OS/2, which permits OS/2 programming interfaces to work transparently across the network.

Microsoft set two goals for the LAN Manager. First, and most important in the short-term, it would like to produce a fast, feature-rich LAN. Second, Microsoft wants to provide a platform for the next generation of distributed systems.

Because OS/2 offers interprocess communications, developers can now write fully distributed network applications to run across a LAN. OS/2 offers several interprocess-communication data mechanisms including the following:

- Pipes, similar to those in Unix.
- Message passing.
- Semaphores.

In the LAN Manager, Microsoft extended the Redirector to support the use of named pipes, facilitating the creation of distributed applications without forcing developers to go through contortions.

Working with OS/2 offers other advantages as well, such as multitasking, support for concurrent communications sessions and access to protected memory.

Additionally, LAN Manager supports group naming, an audit trail to control sessions and logons from workstations and multiple logons from the same machine.

Connectivity catalyst

Running LAN Manager, a server can provide open connectivity to larger systems and distributed applications as well as acting as server "engines" for data base and security tasks and, eventually, even computational ones.

LAN Manager could also, because of its open architecture, serve as the catalyst for some major changes in the marketplace. Because the LAN Manager OS/2 environment is open, nothing prevents a vendor like DEC from creating its own version of IBM's OS/2 Extended Edition for IBM Systems Network Architecture connectivity.

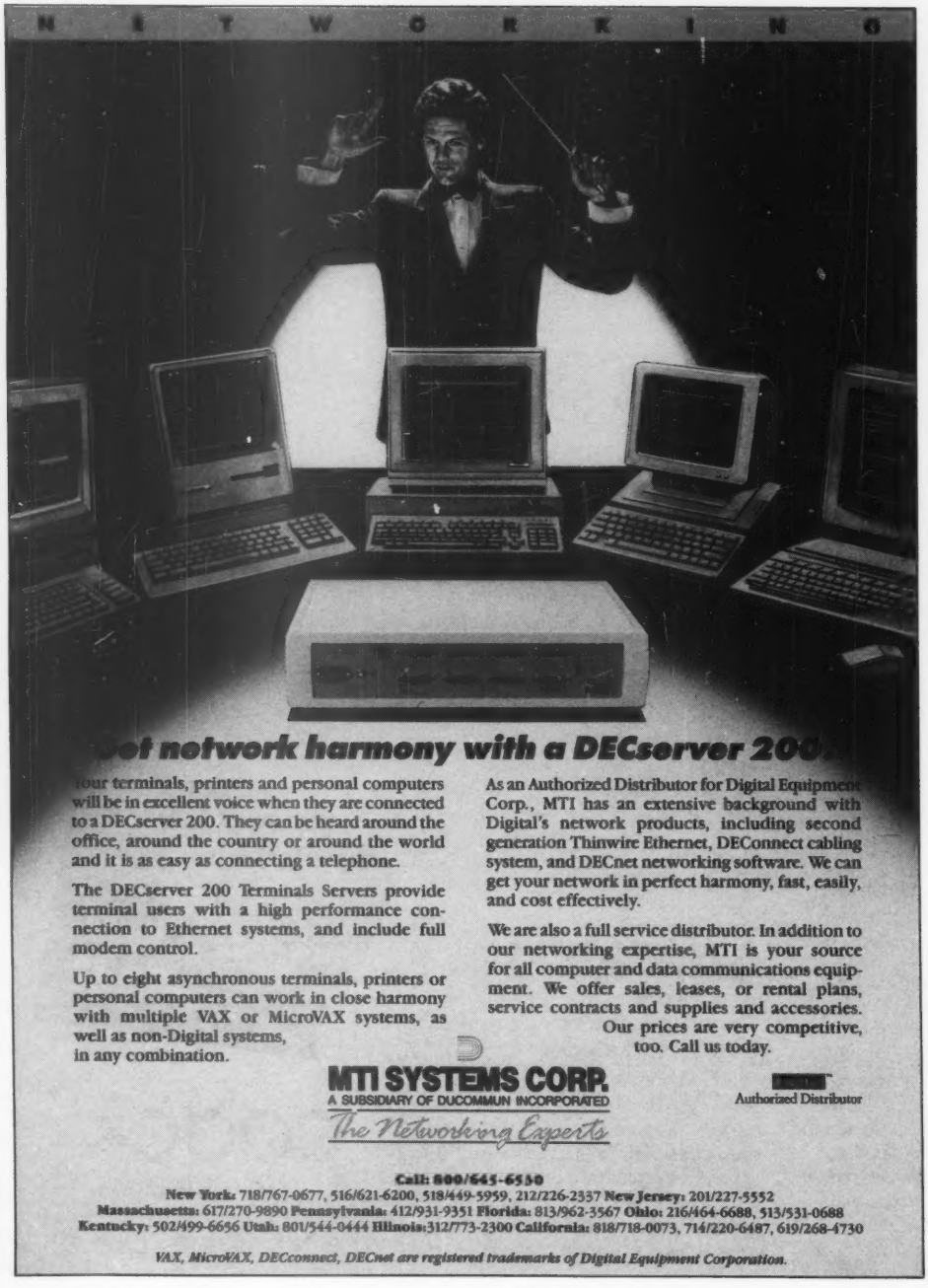
All this is not to say that LAN Manager comes close to offering a complete solution, however. The product does not provide many of the sophisticated network administration tools demanded by large corporate users, users of the type who are beginning to drool over IBM's Netview/PC. This is a gap Microsoft is depending on its OEM community to fill.

The success of the LAN Manager is predicated on the success of OS/2. If nobody writes for OS/2, and the thing thuds to the ground after its launch, then LAN Manager will be stillborn. Such an outcome seems highly unlikely.

Time will be another factor. The first Microsoft release of the OS/2 Software Development Kit (SDK) costs $3,000 and contains the LAN Manager specifications. The software itself will be in an SDK update, slated for release near the end of this year. This, combined with the release schedule for Presentation Manager (probably mid-1988), will more than likely push the first network OS/2 applications to the third or fourth quarter of 1988 — and that is being optimistic.

More realistically, the first good networking systems, including connectivity, administration and so forth, built on top of OS/2 and LAN Manager will not appear until 1989.

DAVID TERRIE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THE EIGHT-HOUR NETWORK: A CASE STUDY IN RAPID DESIGN

In early January, Richard Lefkon and Gerald Wood collaborated on the planning and selection of a local-area network (LAN) to connect accounting, sales, clerical support and business planning personnel at Citibank International's home office in Miami. Wood, financial controller of Citibank International, had been considering the advisability of implementing a LAN for some time. He had made little nuts-and-bolts progress on the project until an appeal to Citibank's Corporate Technology Office hooked him up with Lefkon, an assistant vice-president at Citicorp Investment Bank in New York and author of a book called, appropriately enough, *Selecting A Local-Area Network*. He is also Citicorp's user representative to the Corporation for Open Systems, a network standards organization.

What follows is Lefkon's account of how the two developed an action plan and specifications.

ACT I: Creating the design

Gerry: Until Dick and I started working together, I couldn't really figure out whether I was getting anything of value from the LAN consultants who paraded in and out of my office. Despite having worked in MIS some years back, the buzzwords of today had me confused. For instance, I was puzzled for a short time as to why one of them mentioned the option of bringing in a brass band. "Baseband" just wasn't a term that any of us were familiar with. In fact, the whole idea of local-area networks was so foreign that one of my co-workers, hearing that I was trying to select a network, suggested that the choice should be between CBS and NBC.

As a matter of fact Dick, if you recall our first phone conversation, I told you what I thought a LAN was, and you said, "That's not a LAN."

Dick: That's true. Gerry thought it was a micro-mainframe that controls users.

Gerry: Dick explained that a LAN is a means of sharing devices with no hierarchy — everything talks directly to everything else.

Dick: The relevant buzzword here is "connectivity." The large computer system requires its joined devices to communicate through the central mainframe. But in a LAN, each device, regardless of size or sophistication, must start with an equal ability to access all other devices.

But what we are forgetting to mention is how we came to be talking in the first place.

Gerry: Yes, well what happened is that it eventually became obvious, after several months and a number of consultants, that a new approach was needed. That's when I remembered that Citicorp had organized the Corporate Technology Office [CTO] in 1985 to support the development of technological innovation within the company. I decided to give them a call. I couldn't believe what they told me — an expert right in the bank! I called Dick in New York and explained my objective.

Dick: When Gerry telephoned, he made a point of telling me that Miami is a very nice place to visit in January. It was already late December, and I was not sure Gerry really needed me on-site. I sent him the book and asked him to read the chapter "Quantitative Evaluation of Networks." I told him that filling out the form contained in it would help us match his requirements with the hardware and software that was actually available.

Gerry: Seeing 80 questions about my needs as a user was a pleasant surprise. First of all, I got to concentrate on what I wanted to do with the network, instead of on technicalities. Second, it kept me on the main track, since it dealt only with the communications requirements of the potential users and not specifically with the capabilities of any particular commercial package or functions I had my heart set on.

ACT II: Defining needs

Gerry: I filled in the 80 questions, giving the highest possible score to 12 of the listed requirements: Will your LAN need to:

- Be used by other departments?
- Be able to use one or more central printers?
- Let a disk drive impersonate single personal computer disks?
- Eventually connect between 35 and 200 users?
- Connect more than one floor?
- Connect more than one geographical area?
- Use cabling that conforms to strict local fire laws?
- Have good data base and security features? [Included in this were five questions].

Dick: Those were Gerry's showstoppers, the conditions that had to be fulfilled by any network we envisioned. He also identified another 17 features that weren't immediately imperative but would be later.

Gerry: What struck me was that I was able to identify 18 features that were unnecessary, even though desirable, and 33 that were absolutely not germane to our networking plans.

Dick: Your answers told me that your use of the network could stand an occasional hogging of the network for a few seconds while a long file was sent.

Gerald Wood

Richard Lefkon

> "THE whole idea of local-area networks was so foreign that one of my co-workers, hearing that I was trying to select a network, suggested that the choice should be between CBS and NBC."
>
> GERALD WOOD

Clearly, this wasn't a robot-controller situation, where you had to guarantee that any message would get to any machine in a thousandth of a second.

Gerry: Yes, and when we got back on the telephone around New Year's, nearly the first words out of Dick's mouth were, "You don't need tokens." Nobody had ever told me this before, that I didn't need them.

Dick: Based largely on Gerry's responses, we developed six parameters that would guide any decision we made:

- Use the existing cable plant, if possible.
- Provide in-and-out dial access to our company's Citimail, to telex and to Citibank International offices in Los Angeles, San Francisco, San Diego, San Antonio and Houston.
- Use the previously ordered file server — Compaq Computer Corp.'s Deskpro 386.
- Have an operating system with good security, like Novell, Inc.'s Netware.
- Use central laser printers, like Hewlett-Packard Co.'s Laserjet.
- Expand in phases, starting with about 100 nodes on two floors, including both workstations and servers.

Gerry: The 386s were on order, but Dick said that was acceptable, because they hold a lot and are actually becoming a standard data base server.

Dick: Netware was all right too, because Novell has licensed it to go with just about any configuration of hardware and topology. But an inexpensive token-ring was out because, even though the phone wires were there, it would be impossible to accommodate more than about 75 stations.

Gerry had been in control of premises the year before when the building was redone, and he had had the good sense to pull twice as many strands of cable as he needed. He had twin-axis RG62 cable to serve as his IBM mainframe hookup, and he had 12 phone wires in a parallel cable where he only needed six to connect to his HP.

Ordinarily, you can't send data reliably over the extra pair of wires in a phone cable, because the voltage surge that is used to make the phone ring can throw off the data signals traveling in nearby strands. But, since the only things running on Gerry's six strands were data and signals, the remaining six strands could be used for LANs.

ACT III: The meeting

Gerry: Dick's eight on-site hours began on Jan. 8. He asked me what I wanted to do with my network, whether I could implement it in phases and how I planned to get high- and low-level users involved and oriented. He also had me list vendors that had been in touch with me.

Dick: We spent most of the afternoon and the next morning calling LAN vendors to find out the state of their product line and eliminating any who sounded iffy on support for the necessary configuration. It is important not to assume anything.

In this case, the calls turned up some important information. We found out that only a few of the vendors had products that were benchmarked for the Deskpro 386.

We wound up being forced into a very desirable corner. We would use Ethernet, specifically 3Com Corp.'s 3+ product, for the network cards. Gerry would get his Netware for the server, since the only other appropriate major file access and security vendor required use of its hardware, and Gerry already had the Compaqs. We decided to use a Bridge Communications, Inc. modem server for dialout. It was really a toss-up on whether we should try to reuse Gerry's existing coaxial cable with baluns.

Gerry: You'd better define that word, Dick. I know it's one that you taught me.

Dick: A balun is a connector that can change the end of one cable to electrically look like something else, in this case letting Gerry's RG62 mainframe cable appear as RG58 thin-Ethernet cable. And, to pick up the point, we had to decide whether to use Gerry's existing cable with baluns or to lay fresh RG58.

This raised a cost issue, since you need a repeater every thousand feet. Gerry's existing plant, which is all star-wired into an electrical cabinet, would need many more of those devices, costing more than $1,000 each, than would a new thin-Ethernet cable laid in a straight line.

Gerry: I chose to add the

Continued on page S21

VENDOR VIEWPOINT
Standardize now or accept a forced solution later

BY JOSEPH SEIDLER

Take any 25 network users and there is a good chance at least two of them will have been born in the same month. But take the same 25 users and, more likely than not, none of them will be using the same network standard.

At the moment, the market is confusing, diverse and dynamic, with each of the seven layers of the International Standards Organization's (ISO) Open Systems Interconnect (OSI) presenting vendors with a major decision as to which of more than 100 standards to support.

But what about tomorrow's standards? Will one emerge dominant? There is strong evidence that the ISO OSI standard will become the foundation of all networks. The ISO standard will not follow the same path to prominence as today's network standards, however, because now the users are forcing the issue of conformity.

Dispelling the standards myths

It is the confusion in today's marketplace that has prompted users to seize control of the standards issue. That confusion has developed primarily because today's "solutions" are actually based on a number of myths. If the computer industry is to find a solution that is acceptable to both the manufacturers and the users, these myths must be dispelled.

Myth No. 1: Standards provide the best technical approach to solving problems.

A standard is usually a compromise that attempts to solve an identified set of problems. This results in a less-than-superior approach. Even worse, within any given standard, there exist multiple, incompatible versions of that standard. Although the basic architecture may be common; the higher level protocols of the network will most likely be different, resulting in multiple versions.

Each protocol presents its own array of choices. For example, the local-area network builder must select physical media, an operating system, an access method and dozens of other components. Each of these choices represents a unique path with the potential to create a new problem. At each decision point, the network may diverge from its intended standard, creating more confusion with each new permutation of the eventual product.

For all of these reasons, the reality that counteracts the myth is this: A standard should be treated as the basis for a solution, not as the solution itself.

> THE local-area network builder must select physical media, an operating system, an access method and dozens of other components. Each of these choices represents a unique path with the potential to create a new problem.

Myth No. 2: Being compatible with a standard is the same as being compliant with a standard.

Strictly speaking, "compliant" means "to swallow the religion." "Compatible" means "to pay lip service to the standard." In reality, very few products are compliant with a standard, while the large majority is compatible.

To understand why so many have chosen compatibility over compliance, one need only review Myth No. 1. If any single standard constituted the best approach, vendors would flock to comply with it.

Myth No. 3: Standards emerge in the marketplace within a very short period of time.

Except for de facto standards like IBM's Netbios and Token-Ring Network, it usually takes anywhere from 18 months to several years for a solution to become accepted as a standard. This is because committees established to develop standards must address all the positive and negative issues involved before reaching a final decision. Even if the matters under consideration were not so complex, the committee approach would ensure slow acceptance.

Finding the common ground

None of these myths, however, should stop the industry from establishing or accepting standards.

Even an independent general-purpose LAN vendor, whose business it is to provide systems solutions that mediate among disparate technologies, cannot

Continued on page S28

Seidler is vice-president of marketing for Sytek, Inc. in Mountain View, Calif.

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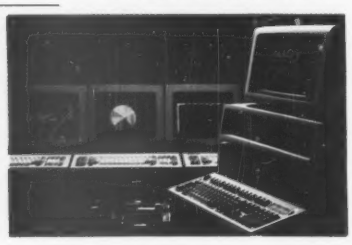

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VENDOR VIEWPOINT
Users gain when industry standards win

BY L. WILLIAM KRAUSE

The battle for industry standards has been waged since the inception of the computer industry. The ultimate winner, whenever a skirmish is resolved, is the end user.

Improving productivity in the office-based work force is essential if the U.S. industry is to regain its worldwide competitive position, but without standards to help us achieve communications compatibility among our information processing tools, we are faced with a potential Tower of Babel and, worse, a nonproductive office-based work force.

The two central issues that need to be clarified at this stage are why standards are needed — and which standards they are.

The benefits of standards are fairly easy to define. It is when we come to the actual selection that complexities emerge. Standards are imperative for the following reasons:

- Standards provide customers with freedom of choice in selecting their computer tools and help ensure a multicompany computer industry — two positive and interlocked goals.
- Standards make applications, communications and connection compatibility possible.
- Standards lower the cost of products for customers.
- Standards provide customers with greater security when it comes to purchasing decisions.

Freedom of choice. Customers want the freedom to select their own desktop productivity tools, whether they are hardware or software. Industry standards allow MIS managers to provide users with guidelines that facilitate independent purchasing decisions and achieve computer communications compatibility goals.

Another positive factor is that the existence of standards fosters a healthy multivendor environment, providing effective alternatives to IBM. This is beneficial for customers, other suppliers in the computer industry and for IBM.

Communications compatibility. One of the major contributions of open architectures and industry standards is to facilitate communications compatibility.

The computer industry now acknowledges that people in business, especially those who work in offices, do not work alone — they work together in groups. Business professionals have learned they can be most productive when they are able to share information and resources. They need desktop computer and application tools that communicate transparently on three levels: within their own work group, among other work groups and above work groups to existing host minicomputers and mainframes. Standards permit this valuable interchange.

Lower cost. Standards lead to manufacturing economies that mean lower prices for the end user. The first Ethernet chips, based on published standards, cost more than $150 each. Today, these chips — with three times the functionality — are available for less than $25 from major U.S. semiconductor suppliers. Standards also attract quality manufacturers willing to invest in development and tooling.

Security in purchasing decisions. When products are based on industry standards, end users are not dependent on the success or failure of a single company. Purchasers can rest assured there will always be more than one company to supply and service products. Also, agreement on technical standards protects the customer's investment in software and training.

An important benefit is that industry standards attract other manufacturers and software developers as the market expands, which gives customers the promise of greater functionality, an increasing selection of useful applications programs and ever-lower prices.

Taken in combination, it is clear the benefits of standards to both customers and suppliers far outweigh the appeal of proprietary alternatives.

Which standards?

Now the question changes: Which are the key and emerging standards that will allow us to achieve our goals of applications, communications and connection compatibility?

To set the stage, it is my belief, as well as that of the majority of the industry's leading computer companies, that the industry is accepting the seven-layer International Standards Organization (ISO) reference model for developing an Open

Continued on page S29

Krause is president and chief executive officer of Santa Clara, Calif.-based 3Com Corp., a leading supplier of work group computing systems.

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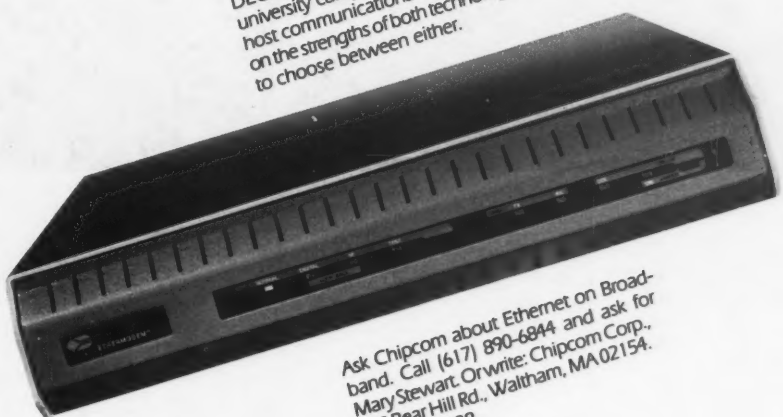

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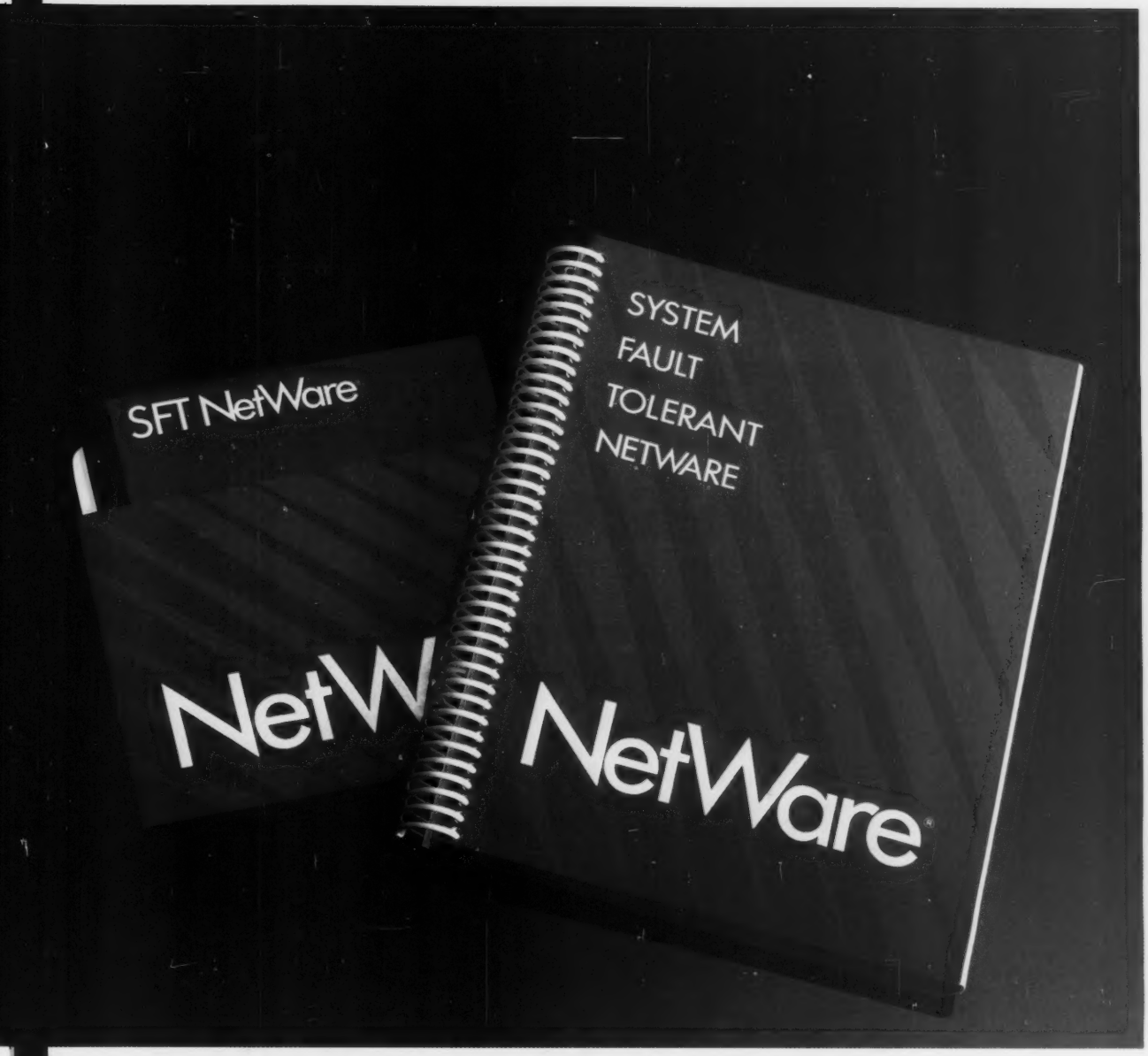

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Milestones Ahead.

How fail-safe is your local-area network security?

BY IRA HERTZOFF

Whenever you distribute data and processing power beyond a single central location, you introduce some level of risk. Local-area networks (LAN) are subject to three major security vulnerabilities: disclosure; destruction or modification of data or programs; and damage to equipment. These risks can be managed, however, through the selection of appropriate hardware, software, applications and operating procedures.

Any LAN provides better security than stand-alone personal computers performing the same functions. The ability to download a single current copy of a program to an end user is a significant improvement, while the LAN's ability to share files resident on the servers ensures that all users are operating on the correct files. Furthermore, since program, data and operating procedures are centrally administered, a LAN imposes a degree of administrative control.

The challenge, however, is to build a LAN suitable for the operation of more critical applications than have previously run on personal computers and provide for access to and from hosts without degrading host security.

LAN security failures are costly in terms of the people affected, the output not produced and the data value lost. The cost of downtime for 60 workstations staffed by people earning $15 an hour, for example, is $900 an hour. Eliminating 10 hours of downtime per year over a useful life of three years justifies spending $27,000 on superior servers, backup power, design and cabling.

LAN security is, in the main, divided into three areas. These are the operating system layer, the physical layer and applications software.

Operating system security

LAN programs and operating systems, the key elements in terms of protection, can be further divided into three major categories.

One LAN group uses Microsoft Corp.'s Networks (MS-Net), which is basically a file- and printer-sharing system, as the network control system. Many manufacturers, including IBM, 3Com Corp., Digital Equipment Corp. and AST Research, Inc., build their systems around MS-Net.

A second group, made up of Novell, Inc.'s Netware and the multitude of OEM versions, consists of single-server LAN operating systems developed from PC operating systems.

The third group, the most visible example of which is Banyan Systems, Inc.'s Vines network operating system, is based on minicomputer multiuser operating systems such as Unix.

Systems using MS-Net as the network shell have several security disadvantages. In these systems, a lock-word authorizes access to a resource. Although vendors often use the two terms interchangeably, a lock-word is not the same as a password. Passwords are assigned to individuals seeking access, but lock-words permit entry to anyone who knows the correct "open sesame." All users must know the lock-word attached to each resource they access. Since the lock-word is the same for all users, it must be distributed and changed — a major administrative task.

Some firms, such as 3Com, promote use of a boot disk that issues the series of lock-words automatically. This approach actually degrades security, necessitating an extra measure of physical protection, because a copy of the disk grants the same authority as the original.

Password confirmation

Novell and the OEMs use a true password. In this system, an authority list contains the resources an individual is authorized to access. The password confirms the user's identity when it is matched against a table of authorized users — a check not present with lock-words. If the combination is valid, the user is authorized to access the resources.

This system is a distinct improvement over the MS-Net approach but still suffers from major security weaknesses. For one thing, audit trails are not complete. Authority lists are unique for each server and must be maintained manually. Users can, with simple programming tools, access and alter the security tables to bypass the authorization and cross-checking. Unnamed, and consequently unknown, resources can be installed on the system. Security rules are not deferred to by default but require positive installation, which permits security to be bypassed due to administrative error.

The best complex network security available today is found in the multiuser, Unix-based Banyan Vines operating system. Vines' Streettalk naming system

Hertzoff is president of I-LAN, Inc., a complex-network systems integrator based in Columbus, Ohio. He is a certified protection professional with 24 years of computer security experience.

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requires that, upon installation, each resource be defined as to ownership. The password system is common across multiple connected servers. Each new server is integrated into the network, eliminating manual recording errors. Full, comprehensive records are kept as audit trails. The password and tables are Unix-based and not accessible to end users who cannot exit the MS-DOS-like network shell.

Another benefit of this system is the ability to distribute security administration. This eliminates the necessity for a superadministrator of mainframe security add-ons to have access to all data and limits its access to the authorized list.

An unstable LAN can never be made secure. If a network is reliable under normal operating conditions, then resources may be devoted to making it function under abnormal ones. LAN security, therefore, starts with designing for stable operation.

AN UNSTABLE LAN can never be made secure. If a network is reliable under normal operating conditions, then resources may be devoted to making it function under abnormal ones. LAN security, therefore, starts with designing for stable operation.

The recently announced NCR Corp. 3390 intelligent workstation displays the benefits a LAN-specific workstation can provide. To eliminate the risk of data being copied or foreign programs being introduced to the system, this workstation provides two operating modes. One is a read-only memory (ROM) boot that loads MS-DOS and the network shell from the network, while the other is a hard-disk-only mode. Obviously, if there is no removable storage, then this exposure is removed.

A ROM boot feature is also provided on the IBM Token-Ring Adapter/A Remote Program Load option, which is erasable programmable read-only memory. Another advantage of this device is that it has only one slot, which is for the network interface. User alteration of settings or introduction of add-on cards is a major cause of trouble on LANs.

Protecting the physical layer

Cable topology or network architecture is the basis for physical security. There are two major standards — IEEE 802.3 (Ethernet) and IEEE 802.5 (token-ring). The selection of one or the other will affect reliability in two ways. The more recent token-ring design has superior error detection and correction facilities, while the older Ethernet design has fewer active components. The trade-off is that while it is easier to locate and isolate problems on a token-ring network, networkwide failures occur less often with Ethernet.

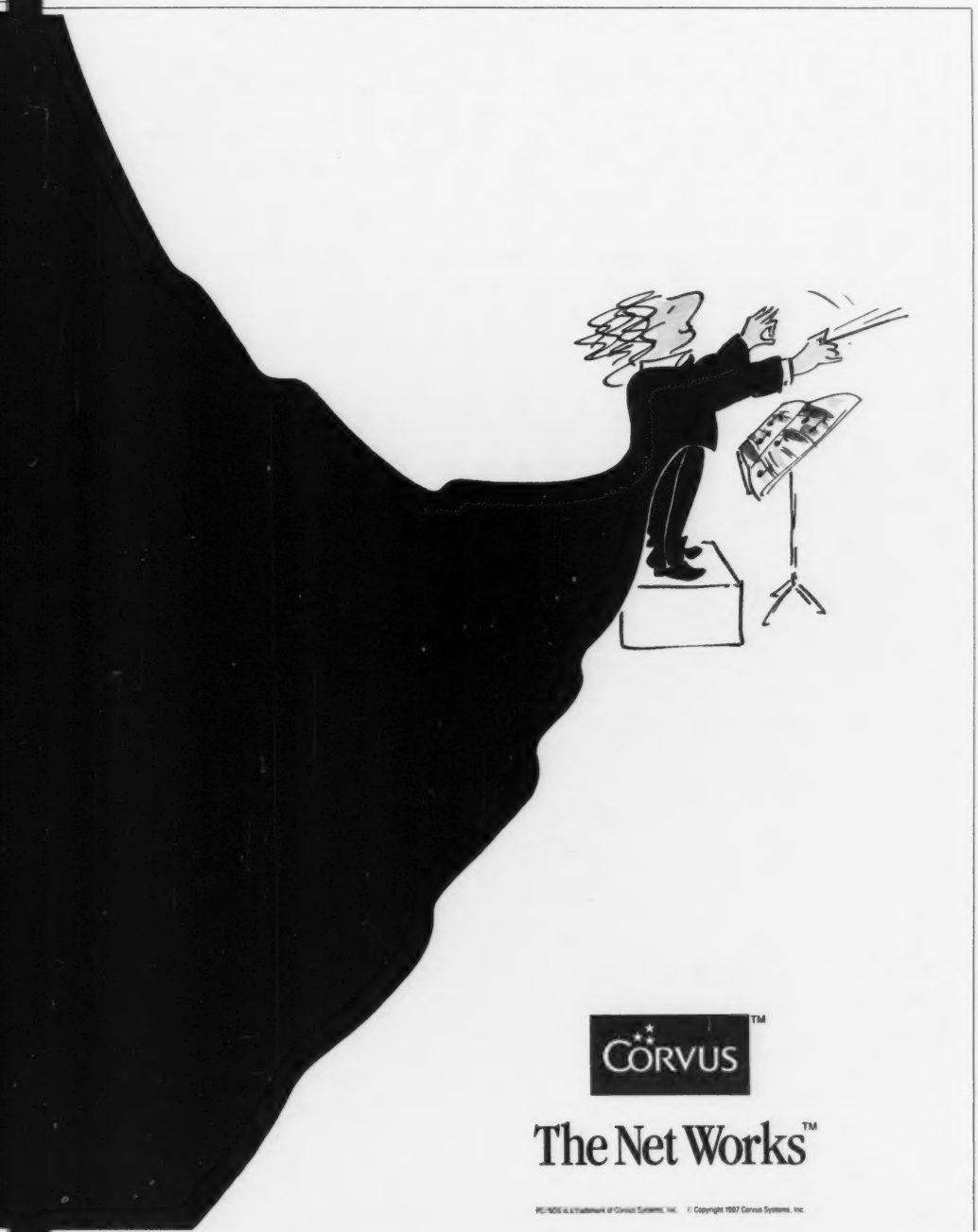
Both architectures are well supported by a variety of manufacturers. Anyone can tap into an Ethernet cable or use an available port on a token-ring access unit or IBM Cabling System outlet. For that reason, the physical integrity of certain components is more important for security than is the network interface. Network cabling should always be designed with terminations in secure areas. LAN connections should not be accessible to nonauthorized personnel. In very high-security environments, fiber-optic or pressurized cable should be specified.

With some types of Ethernet cabling, a poorly installed tap can degrade performance on the entire network, and troubleshooting can be costly. In a token-ring LAN, the network configuration can be altered by anyone with access to the wire centers or access units. The secure approach is to use a wire closet with a distribution frame and equipment racks using patch cables for interconnection. By placing all connections in a locked wire closet and providing diagnostic taps and tools, the system is protected against vandalism, troubleshooting is faster and the network can be restored to service more rapidly in the event of a cable, tap or access unit problem.

Cabling is a major component of network stability and, because of the capital investment involved, one that is difficult to alter if improperly designed. Shortcuts degrade security in ways that are difficult to quantify and correct. For both operational and security reasons, this is not the area in which low initial cost should be a design objective.

From a security viewpoint, LAN-specific workstations enhance LAN security by ensuring management control for all systems. Some well-known LAN vendors repackage IBM Personal Computer AT clones and call them servers. This can be a source of problems, because a network server will be driven far harder than any AT. It is best to look for a vendor who builds minicomputer-like systems designed to work 24 hours a day for years.

All in all, the Banyan Vines operating system and hardware, Ethernet or token-ring interfaces, physically protected wiring and purpose-built servers are the preferred approach for multiserver networks attached to hosts. The Novell Netware systems are acceptable for departmental systems with low connectivity and security needs. MS-Net-based systems are not acceptable for any use other than printer and file sharing without significant security needs. ●



Overcoming early skepticism, gateways pass the test, gain user acceptance

BY GARY T. BAKER

Local-area network (LAN) gateways are one of the newest faces on the connectivity scene, but they are quickly making an impact on the LAN marketplace. Attracted by the cost savings that gateways offer, in comparison with more traditional personal computer-to-host links, and reassured by the fact that initial bugs now seem to have been ironed out of the products, many corporations are beginning to seriously consider gateways for their micro-to-mainframe needs. A few, in fact, are even going so far as to buy a LAN just to get the gateway.

This acceptance was hard won. Until recently, many users and even vendors refused to believe that a single nondedicated PC on a LAN could handle the multitude of duties of a $10,000 IBM 3274 cluster controller — which is what many of the Systems Network Architecture (SNA) gateways on the market today do. "That's always the question with skeptical users," says Bob Marsh, technical support manager at Information Technologies, Inc., a Phoenix-based gateway manufacturer. "Can this gateway give me the performance of a 3274 setup?"

The skepticism was justified, Marsh admits. "It has been a sort of 'beta year' for gateways," he observes, noting that the trial-and-error period stretched out long beyond the few weeks normally associated with beta tests.

There were reasons for this of course — such as that fact that gateway developers were trying to do things with Microsoft Corp. MS-DOS and IBM PC-DOS, like pseudo-multitasking, that neither had ever been intended to do. But even legitimate excuses can seem pretty limp after repeated failures. "A lot of big users have been testing out everything on the market, seeing how the products perform and what their bugs were, and, for a long time, all of them fell short of expectations," he says.

But that's history now, Marsh says. Gateways have stopped failing, he says, and users are starting to believe and buy.

Bugs were not the only obstacle standing in the way of to market acceptance of gateways. Performance problems resulting from lack of peer-to-peer communications were also standing in the way until quite recently, acting as a significant inhibitor.

The problem was that, before the acceptance of IBM's Netbios and Novell, Inc.'s IPX — both peer-to-peer protocols for LANs — there was no way to establish a direct link from the PC to the gateway. Most gateways had to employ a centralized file server to mediate communications with individual PCs, an extra step that hampered throughput. Now, however, many gateway vendors have implemented peer-to-peer links and, thereby, improved their products' performance.

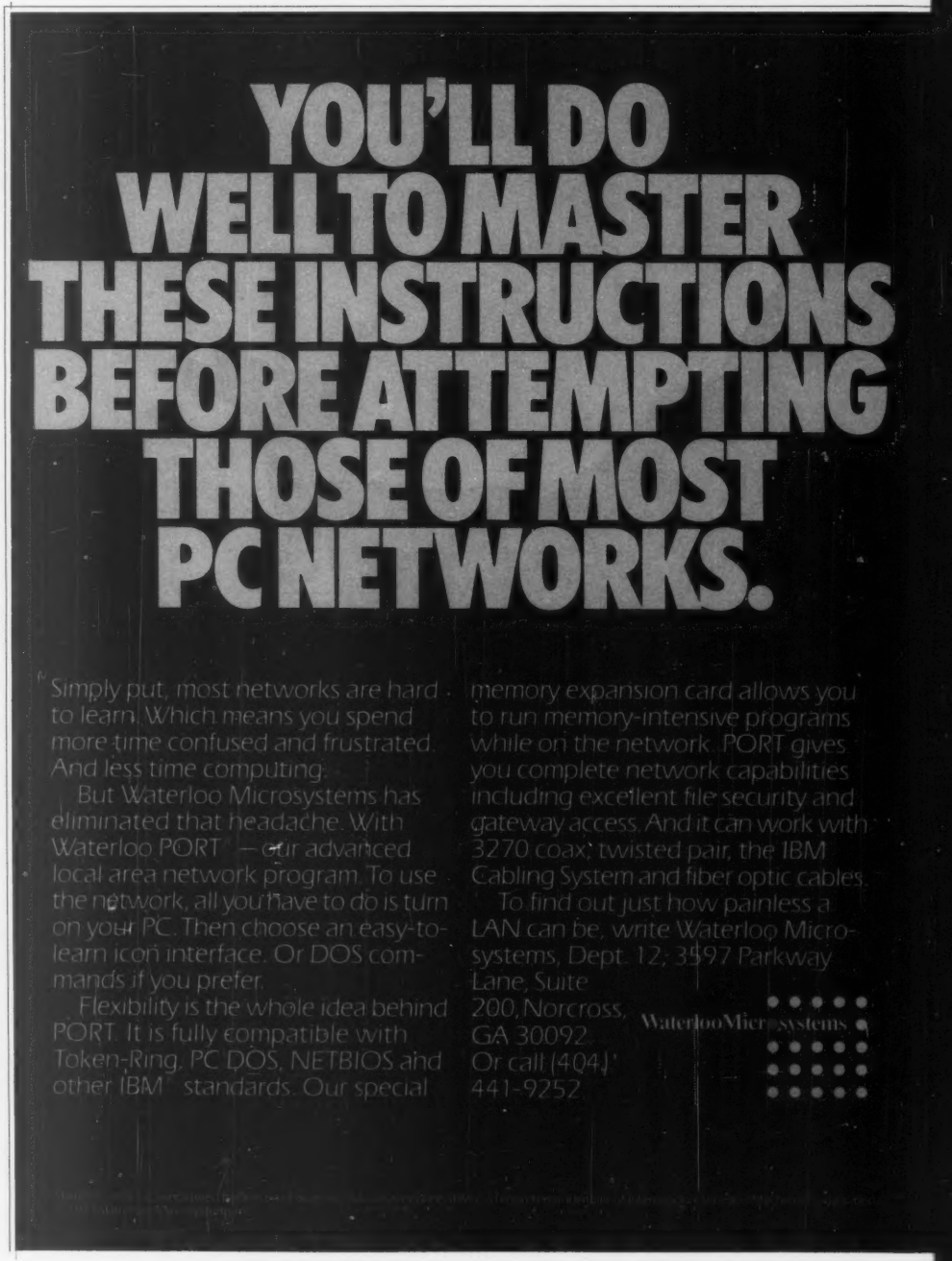
User response to the changes has been positive. Bill Riley, telecommunications manager and network administrator at General Accident Insurance Company of America in Philadelphia, speaks of his company's 13 LAN-to-mainframe gateways in glowing terms. "We're very satisfied with them — no problems or bugs at all," he says. "We just take them for granted."

Jim Rosen, vice-president of LAN Systems, a New York-based LAN installation and consulting firm, says the gateways his firm installs are some of the most trouble-free parts of most networks. "The clients love them," he claims.

It is not just bug-free operation and decent throughput that is driving up gateway sales, though. The cost savings of a gateway compared with the more traditional coaxial card-to-3274 link, like Digital Communications Associates, Inc.'s Irma, can be staggering. Besides requiring a $10,000 3274, stand-alone links need both a coaxial card and a dedicated coaxial link to the controller for each PC. Whereas a gateway serving 32 PCs on a LAN might cost $6,000, this setup for the same number of stand-alone PCs could run to nearly $50,000. And the dedicated cables are not only an added cost but an added burden on already congested cable raceways.

Another alternative to gateways besides stand-alone coaxial cards is to use regular IBM 3270 terminals with a cluster controller. This solution is not much cheaper than buying Irma cards for every PC, however, and it also means users will

Baker is a senior writer for *LAN Magazine*. He has worked as a programmer, consultant and technical writer in New York City.


YOU'LL DO WELL TO MASTER THESE INSTRUCTIONS BEFORE ATTEMPTING THOSE OF MOST PC NETWORKS.
Simply put, most networks are hard to learn. Which means you spend more time confused and frustrated. And less time computing.
But Waterloo Microsystems has eliminated that headache. With Waterloo PORT — our advanced local area network program. To use the network, all you have to do is turn on your PC. Then choose an easy-to-learn icon interface. Or DOS commands if you prefer.
Flexibility is the whole idea behind PORT. It is fully compatible with Token-Ring, PC DOS, NETBIOS and other IBM standards. Our special memory expansion card allows you to run memory-intensive programs while on the network. PORT gives you complete network capabilities including excellent file security and gateway access. And it can work with 3270 coax; twisted pair, the IBM Cabling System and fiber optic cables.
To find out just how painless a LAN can be, write Waterloo Microsystems, Dept. 12, 3597 Parkway Lane, Suite 200, Norcross, GA 30092. Or call (404) 441-9252.
Waterloo Microsystems

often need both a terminal and a PC.

With gateways, however, PCs can become universal workstations. Instead of having a 3270 terminal, a DEC terminal and a PC on one desk, the networked PC can act as all of them, using an SNA gateway to emulate a 3278 and an asynchronous gateway to emulate a DEC VT100.

With these advantages, gateways are becoming more attractive to corporate customers. International Data Corp. (IDC), a Framingham, Mass.-based market research firm, predicts that this year, gateways will make up 13% of all 3270 micro-to-mainframe sales. A year ago, the gateways hardly made a dent in the glutted coaxial card market.

As connectivity becomes more important, gateways are a decisive factor when buying a LAN. "Gateways are one of our biggest selling points for LANs," LAN Systems' Rosen says. "It makes the economics of a LAN much more attractive."

The appeal of gateways has even attracted customers to LANs who have no use for the network's other functions. "A lot of our clients are buying LANs just for the use of a gateway," claims Nathan Roseman, president of LAN Services, Inc., a New York-based consulting firm serving Wall Street. "We did an installation on a major mutual fund house, and they bought the network for the sole reason that they wanted the gateway."

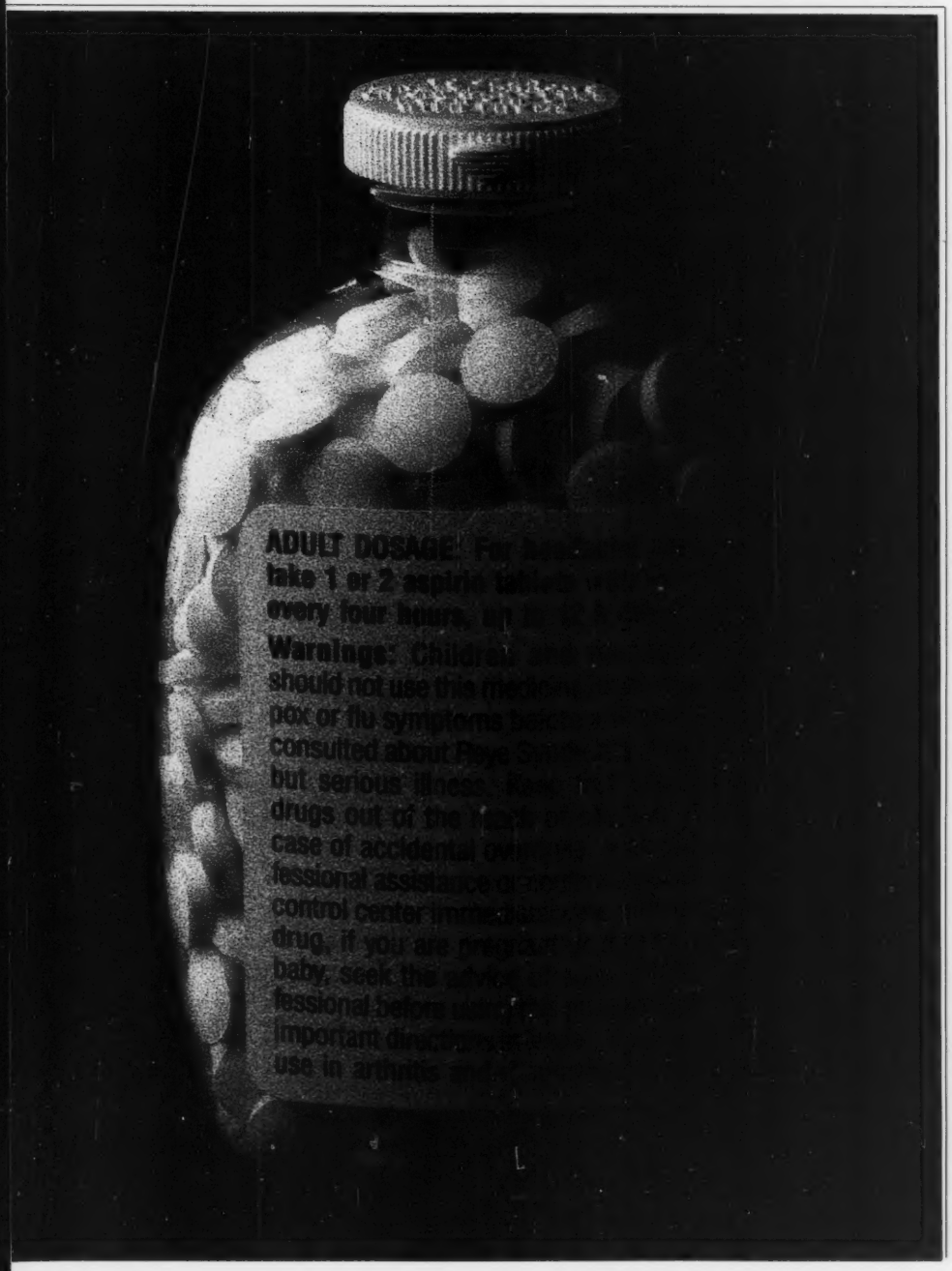
Banyan Systems, Inc., a LAN maker in Westboro, Mass., reports encountering a similar situation with one of its customers, Rockwell International Corp.

Rockwell maintains remote links between field users with laptop computers and a centrally located SNA gateway-equipped Banyan file server. This arrangement, according to the firm, was designed to provide users with ready access to mainframe data while on the road. "That was their only requirement," says Carol Wolicki, a Banyan spokeswoman. "They didn't need any of the functionality of a LAN except the gateway. But the LAN met their needs, so they bought it."

Some LAN vendors are courting this customer, with advertisements and specialized technology. Banyan is devising a campaign to convince users who are reluctant about LANs — or who have not even considered one — that a gateway alone is reason enough to buy a network. And Gateway Communications, Inc. in Irvine, Calif., has a product called GNAM, which is technically a LAN but one primarily geared toward gateway functions.

Despite the growth spurt the gateway market is experiencing, there are clouds in its future. Gateways have their drawbacks — they are fairly expensive, they are slow, and their file transfer functions sometimes lack sophistication.

LAN Systems' Rosen sees these factors becoming critical within a few years. "I think what we'll be seeing is a lot more direct network links between micro and host using a protocol like Transmission Control Protocol/Internet Protocol. Once that starts happening, gateways will begin to disappear. I'm afraid they have a limited lifetime." •



Rapid design

CONTINUED FROM PAGE S13

RG58, but for others who might be in slightly different circumstances, baluns might be better.

Epilogue

Gerry: And that's how we designed a large network in eight hours.

Dick: What we've discussed relates only to network design, not subsequent preparation of users and installation. And the fact that I was acquainted with the specialists at many vendor companies helped to shorten the process.

Starting next year, though, the design process should be shorter and easier for everyone. It probably won't be necessary to go through that kind of fact-finding process at all, because a lot of the compatibility issues will be clearing up. By that time, the Corporation for Open Systems (COS) will have begun to certify network product conformance to standards. Then, at least in theory, you'll be able to use the COS "gold dot" to spot products proven to work according to known standards. •

Points to ponder

Some of the most important questions that should be answered in preparation for evaluating LAN options have to do with planned usage.

Ask yourself, "If we install a network, should it be able to do the following:"

- Be used by other departments?
- Permit video transmission such as CATV or teleconferencing?
- Explicitly provide for use of telephone company lines?
- Handle the sending and receiving of very large data files?
- Deliver thousands of small messages per second between stations?
- Supply an electronic mail facility between stations?
- Have one or more central printers?
- Let a central disk drive impersonate individual PC disks?
- Support background processing sent by workstations?
- Serve also as a conduit for centralized CPU time-sharing?

The above questions were excerpted from an evaluation form included in Lefkon's book, *Selecting a Local-Area Network* (American Management Association, 1986).

Be they long and winding or point-to-point, LANs suit every need

BY DEBORAH COOPER

When a company's needs grow beyond stand-alone computing, local-area networks (LAN) are frequently a logical alternative. Until recently, however, both their complexity and their prohibitive prices scared away many potential purchasers.

Now, LANs come in so many varieties that most organizations are able to find one that suits their needs and their budget. Talk to three different companies and you may easily find three different LAN solutions.

Software AG of North America, Inc. in Reston, Va., a company that develops and markets data base management and fourth-generation language software for mainframes, is a young and rapidly expanding company that found itself in the market for a LAN when it became apparent that the need for access to laser printers was widespread.

> LANs come in so many varieties that most organizations are able to find one that suits their needs and their budget. Talk to three different companies and you may easily find three different LAN solutions.

When a sub-LAN is enough

Although Software AG equipped its staff with either IBM Personal Computer ATs and XTs or Compaq Computer Corp. Deskpro 286s, it could not afford to provide each with a $3,000 laser printer. So about 18 months ago, the company purchased a low-cost off-the-shelf asynchronous local-area network that allows printer sharing. This system cost about one-fifth as much as a conventional LAN.

Digital Products, Inc. in Watertown, Mass., manufacturer of Software AG's LAN, calls its Netcommander product a "sub-LAN," since it connects PCs over standard RS-232 serial-port communications cable. Using point-to-point exchange rather than ring technology, it provides a virtual data path between two points that continues until a job is completed. These low-cost LANs allow clustered PC users to share printers, perform simple file transfers and link minicomputers or hosts for a cost of about $200 per node.

"We didn't want a full-blown LAN because we didn't want to be dependent on manufacturers for maintenance and support," says Ken Seligson, senior information systems analyst at Software AG. "With Netcommander, however, we don't have to buy a network, add boards, write new software or hire a special network administrator."

Software AG could not avoid purchasing 40 Hewlett-Packard Co. Laserjet printers, but by making use of the sub-LAN, each printer can now be shared by four to 15 users.

Although Netcommander offers file transfer and disk sharing, it does not offer file sharing and serving, functions that Digital Products says most PC users do not yet require.

The sub-LAN architecture consists of software that uses MS-DOS-like commands, based on Microsoft Corp.'s operating system, standard MS-DOS utilities and an expandable high-speed buffer that allows automatic queueing of documents. Netcommander uses a Zenith Data Systems Z-80 processor in order to control the network ports.

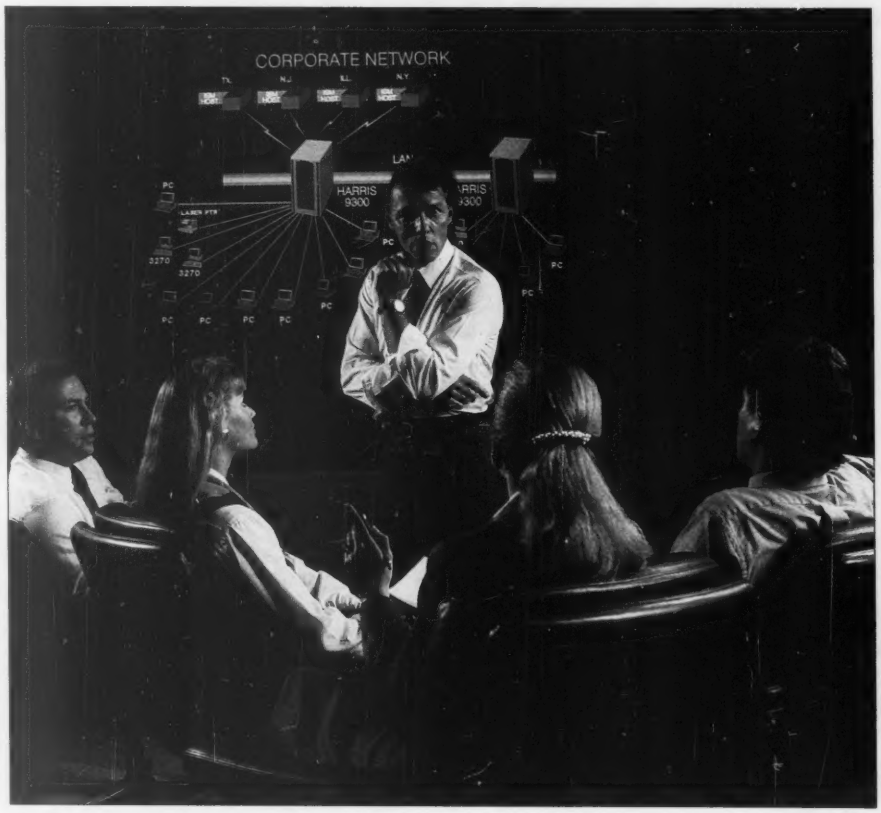
Installation was uncomplicated, Seligson says, since all it required was laying standard RJ-45 telephone cables between work clusters and printers.

A sub-LAN was not a viable option for California-based Longs Drug Stores, Inc. According to the company's MIS director, Bill Gates, that approach is out of the question when you have a hodgepodge of personal computer brands and types at your company that have to be connected to Hewlett-Packard's HP 3000 computers.

Four HP 3000 minicomputers operate out of the company's Walnut Creek headquarters. Each handles a separate function — including personnel, merchandising, distribution, testing and development — and can be accessed from any personal computer using Hewlett-Packard's Advance Network.

Long's 2-year-old Advance Network

Cooper is a Boston-based free-lance writer.



Think Globally.

As a MIS executive, corporate network control is the most important issue facing you and your organization. Integrating personal computers into an overall corporate strategy that supports and enhances your mainframe, databases and application software investment— while still providing services to end users—has been a difficult and, at times, impossible task. Until now.

Introducing The Harris 9300

The Harris 9300 is a powerful communication system combining the best of PC-based local-area networks (LANs) with access to mainframe resources. The system is ideal for professionals and departments that operate in a mixed systems environment of PCs and 3270 and RJE terminals.

Control And Protect

The Harris 9300 is designed to provide network control and management without abandoning your existing equipment.

Up to four mainframe connections may be running at once using any of five different protocols, including 3270 SNA and Bisync, RJE SNA and Bisync, and SNA LU6.2. This means any PC or workstation on a Harris 9300 can have mainframe access, easily and inexpensively.

The Harris 9300 consolidates as many as 16 personal computers and 16 3270 terminals on a single, direct line to the host. And, by networking multiple Harris 9300s together, that direct line can support more than a hundred PCs and terminals, providing an elegant solution for bridging the stand-alone world of individual PCs with your

provides communications links from departmental personal computers to the HP 3000 minicomputers as well as to the corporate IBM mainframe. All the connections rely on IEEE 802.3 twisted-pair telephone cabling, which is the industry standard.

A gateway called HP Officeconnect-to-Disoss, referring to IBM's Distributed Office Support System, also allows electronic mail exchange, filing and automatic document conversion between the HP 3000 — running HP Deskmanager software — and the mainframe.

"The LAN is so transparent that most users never realize which HP 3000 they are accessing," Gates says. "This also meant that no special training was required."

"WE CHOSE IBM's Token-Ring when we realized there probably were not going to be any more enhancements to the 3083."

WILLIAM RILEY
GENERAL ACCIDENT INSURANCE COMPANY OF AMERICA

With 450 users within corporate headquarters, there is a lot of traffic over the LAN, Gates says. Besides accessing the four HP 3000s for merchandising and product information, the network also gets heavy use from electronic mail transmissions. In addition, each Longs Drug Store has its own HP 3000, but in locations as far-flung as Hawaii or Colorado, stores must rely on electronic mail for fast communications with headquarters.

The biggest advantage Gates sees in Advance Network, he says, is its 10M bit/sec. speed, which is important when you have 200 retail stores clamoring for product information on anything from liquor to hardware.

When Philadelphia's General Accident Insurance Company of America found itself outgrowing the IBM 8100 network that linked all its home-office PCs to the IBM 3083 mainframe, the company looked for another micro-to-mainframe solution. "We chose IBM's Token-Ring when we realized there probably were not going to be any more enhancements to the 3083," says William Riley, telecommunications manager.

Luckily, General Accident Insurance was in the midst of major office renovations when it decided to go with a Token-Ring solution.

"We were relocating offices as well as wiring them for full voice and data communications, so laying the extra cable was really no more trouble," Riley says. "The up-front cost was expensive, but now we won't have to be calling an electrician back."

Although the Token-Ring gave General Accident Insurance's home-office users a way to access the mainframe and share data among themselves, it did not allow them to share data with the company's 40 field offices, which are located throughout the U.S.

The company solved this problem by purchasing the Synchronous Data Link Control Gateway PC Adapter from Integrated Network Systems, Inc. The Mobile, Ala., company's software-and-hardware product provides personal computer users — no matter where they may be located — with a gateway to the Token-Ring and the mainframe.

A SPEED of 10M bit/sec. is important when you have 200 retail stores clamoring for product information on anything from liquor to hardware.

According to Riley, by early 1988 all field offices should be linked, with some larger offices having multiple gateways. "Each office, in effect, will have its own LAN that can operate independently of the home office," he says. Eventually, more than 600 PC users will share data over General Accident Insurance's network.

Installation of the network has not been cheap, Riley admits. "But to stay competitive," he says, "we had to make the initial investment. And although we could have gone with something less expensive, the quality and speed of transmission and type of cabling would not have been as good."

Prior to 1980, General Accident Insurance, like most other insurance companies, made little use of personal computers.

During the past six years, however, the picture has changed dramatically, with underwriters, claims handlers and data entry clerks all converting to the use of PCs. Using the combination of LAN and gateway, they can also access other company and governmental data bases as well as get optimum use from the corporate mainframe.

"The field office engineers are very excited about this," says Nancy Alter, General Accident Insurance's networking manager. "They feel that we've really gone from the dark ages and skyrocketed right into the '80s." •

Act Locally.

major investment in centralized databases and applications.

Get The Lay Of The LAN

The Harris 9300 is also a powerful PC LAN and file server, supporting NETBIOS applications, and is compatible with IBM's PC network and token-ring architecture. What's more, MS-DOS 3.1 programs are supported on the network. The Harris 9300 also allows you to share resources such as laser printers, high-speed band printers, modems, terminals and PCs, maximizing your investment in existing systems and peripherals.

To help you plan and manage networks on a corporate and departmental basis, without sacrificing individual PC application productivity, call Harris at 1-800-4-HARRIS, ext. 5001.

We're Ready To Communicate

We'll send you free in-depth product, application and technical information concerning how the Harris 9300 can help you control your corporate and PC networks before they control you. We'll also provide you with information concerning our unique, nationwide network maintenance, service and support programs—all backed by Harris Corporation, a $2.2 billion leading supplier of information-technology equipment and systems.

If this all sounds good to you, think and act today by calling 1-800-4-HARRIS, ext. 5001 or by writing to Harris Corporation, National Accounts Division, 16001 Dallas Parkway, Dallas, Texas 75380-9022.

HARRIS

Purpose-built local-area network servers

COMPANY	PRODUCT	PROCESSOR TYPE	CLOCK SPEED	NUMBER OF WAIT STATES	MAXIMUM MEMORY CAPACITY	MEMORY CYCLE SPEED	MEMORY CHANNEL WIDTH	TRANSFER BUS CHANNEL WIDTH	MAXIMUM NUMBER OF ATTACHED WORKSTATIONS	PRICE
Asher Technologies, Inc. (800) 334-9339	Ashernet File Server	80286	8 MHz	1	15M bytes	11 clock cycles	16 bits	16 bits	256	$15,776
Banyan Systems, Inc. (617) 898-1000	Banyan/BNS-Pedestal Server	68000	10 MHz	0	8M bytes	400 nsec	16 bits	16 bits	60	From $16,245
	Banyan/DTS Desktop Server	68000	10 MHz	0	5M bytes	400 nsec	16 bits	16 bits	25	From $11,995
Classic Technology Corp. (800) 392-8324	Solution AT	80286	15.3 MHz	1	16M bytes	100 nsec	16 bits	—	10	$3,795
Communication Machinery Corp. (805) 963-9471	Transerver	68010	10 MHz	0	512K bytes	10 MHz	32 bits	16 bits	10	$2,495
Convergent Technologies, Inc. (408) 434-2848	Server PC	80386	20 MHz	0	64M bytes	—	32 bits	16 to 32 bits	64 PCs or 32 Unix terminals	Contact vendor
	S/Series Family	68020	12.5, 16.7, 25 MHz	0	64M bytes	—	32 bits	32 bits	64 PCs or 64 Unix terminals	Contact vendor
Corvus Systems, Inc. (408) 281-4100	Omniserver	80286, 80386	8 MHz (80286), 16 MHz (80386)	1	16M bytes	375 nsec for 8 MHz, 187.5 nsec for 16 MHz	16 bits (80286), 32 bits (80386)	8 or 16 bits (80286), 8, 16 or 32 bits (80386)	Unlimited, depending on hardware and software	From $3,995
Data General Corp. (800) DATAGEN	MV	Proprietary	Processor-dependent	0	64M bytes	Processor-dependent	32 bits	32 bits	Varies	Contact vendor
Icon International, Inc. (801) 225-6888	Icon MPS-020	68020	16.7 MHz	0	1G byte	85 nsec	256K bits	64M bits	32	$30,000
Lancore Technologies, Inc. (818) 991-5100	Lancore series	80186	8, 10 MHz	0	300M bytes	22 nsec	16 bits	16 bits	Operating system-dependent	Contact vendor
Lanier Business Products, Inc. (800) 241-1706	Concept 4300	80186	10 MHz	0	2M bytes	120 nsec	2.5 million transfers per second	2.5 megawords per second	8	Contact vendor
	Concept 6000	80186	10 MHz	0	2M bytes	120 nsec	2.5 million transfers per second	2.5 megawords per second	168	Contact vendor
Lee Data Corp. (612) 828-0300	Lanmaster	68000	9.54 MHz	0	Up to 8M bytes	—	16 bits	8 bits	40	$13,900-$15,600
L/F Technologies (702) 883-7611	Cubix System V	80286	8 MHz	0	8M bytes	120 nsec	16 bits	16 bits	16	$9,995
Nestar Systems, Inc. (415) 469-1777	Plan series	68000, 68020	8, 12 MHz	0 or 1	2M to 16M bytes	68M to 1.1G bytes	16 bits	8 bits	255	$10,000-$35,000
The Network Connection (800) 327-4853	TNC/A	80286	10 MHz	1	40M bytes hard disk, 1.2M bytes floppy	—	8, 16 bits	8, 16 bits	100	Contact vendor
Novell, Inc. (800) 453-1267	Novell Netware 286A File Server	80286	6 or 8 (switch selectable)	0	12M bytes	250 nsec	16 bits	8, 16 bits	100 logical	$7,095-$11,090
	Netware Server 286B	80286	6 to 8 MHz (software selectable)	0	12M bytes	250 nsec	16 bits	8, 16 bits	100 logical	$1,195-$19,195
	Netware Server 68B	68000	8 MHz	1	8M bytes	335 nsec	16 bits	16 bits	255 logical	$6,090-$7,285
The NTI Group, Inc. (408) 739-2180	Desnet Server	80286	10, 12 MHz	0 or 1	1M byte (system memory) or 80M-320M bytes (disk memory)	120 nsec	16 bits	16 bits	100	$4,700
Pathway Design, Inc. (800) 343-0515	Netpath	80188	8 MHz	1	256K bits	8 MHz	8 bits	8 bits	32 communications sessions	$2,595-$4,595
Sun Microsystems, Inc. (415) 960-1300	3/160S	68020	16 MHz	1.5	16M bytes	—	32 bits	32 bits	18	$17,900
	280S	68020	25 MHz	0	32M bytes	—	64 bits	32 bits	50	$32,900
	3/180S	68020	16 MHz	1.5	16M bytes	—	32 bits	32 bits	50	$18,900
	260S	68020	25 MHz	0	32M bytes	—	64 bits	32 bits	18	$31,900
	3/140S	68020	16 MHz	1.5	12M bytes	—	32 bits	32 bits	NA	$10,900
Sytek, Inc. (415) 966-7400	Sytek 6610 Network Server	80286	8 MHz	0	16 bits	—	—	—	—	Contact vendor
3Com Corp. (408) 562-6508	3Server3	80186	8 MHz	0	3M bytes RAM and 910M bytes disk storage	250 nsec	16 bits	16 bits	100	$5,995
Univation, Inc. (408) 263-1200	Lifeserver Series	80186	8 MHz	0	512K bits	10 MHz	16 bits	8 bits	512	$9,995-$16,000
Waterloo Microsystems, Inc. (404) 441-9252	Waterloo Port	8088, 80286, 8086, 80386	Machine dependent	1 at 8 MHz	1.64M bytes	Machine dependent	—	—	254	$1,695

The companies included in this chart responded to a recent telephone survey conducted by *Computerworld*. Further product information is available from vendors.

Local-area network operating systems

COMPANY	PRODUCT	HARDWARE INDEPENDENT	HARDWARE SUPPORTED	HOST OPERATING SYSTEM SUPPORTED	EMULATES OR RUNS ON TOP OF HOST OPERATING SYSTEM	USES MICROSOFT REDIRECTOR	FULL COMPATIBILITY WITH NETBIOS	DISK- OR FILE SERVER-BASED	HOST COMMUNICATION FOR NETWORK MANAGEMENT	SUPPORTS CONCURRENT SERVERS	FILE/RECORD LOCKING CAPABILITIES	ADDITIONAL CAPABILITIES	PRICE
Able Computer, Inc. (714) 979-7030	Resource Manager	Yes	Any asynchronous communications computer	Any asynchronous computer	NA	NA	No	Terminal server	NA	NA	Yes	None	Contact vendor
Alisa Systems, Inc. (818) 792-9474	Alisatalk	No	—	VMS	Runs on top	No	No	File server	Yes	Yes	Yes	None	$3,750-$11,500
Applied Knowledge Groups, Inc. (800) 443-1254 (800) 422-1254 (Calif.)	Knowledge Network	Yes	Any PC compatible, IBM PS/2 Models 30, 50, 60	MS-DOS up to 3.3, PC-DOS	Runs on top	No	Yes	NA	NA	NA	Yes	None	$149.50 per node
AST Research, Inc. (714) 863-1480	Advanced Netware	Yes	—	Proprietary	Runs on top	—	—	File server	Yes	Yes	Yes	Electronic mail	$795 (Netware 86 for 8 users), $1,595 (Advanced Netware 86 for 100 users), $2,195 (Advanced Netware 286 for 100 users)
AT&T (800) 247-1212	AT&T Network Access Software	Yes	Star, 802.3 1M bit/sec.	MS-DOS 3.1, Unix System V	Emulates	No	Yes	—	Yes	Yes	Yes	Electronic mail	$125 per node
Banyan Systems, Inc. (617) 898-1000	Vines	Yes	Proprietary, IBM AT and compatibles, Convergent, Lee Data network servers, TRW, Tallgrass Technologies	MS-DOS 2.1 to 3.2	Runs on top	No	Yes	File server	Yes	Yes	Yes	Electronic mail, bulletin board, asynchronous and bisynchronous X.25	$1,895
Centram Systems West, Inc. (415) 549-5900	TOPS	Yes	IBM PC, AT, XT and compatibles, PS/2 Model 30, Macintosh, Unix	MS-DOS 2.1 or higher, Macintosh, Unix	NA	No	No	File server	No	Yes	Yes	None	$149-$389 per node
Classic Technology Corp. (800) 392-8324	Task Master	Yes	Classic multiuser system	PC-DOS, MS-DOS 3.0 or higher	Runs on top	—	—	—	—	—	—	—	Contact vendor
Communication Machinery Corp. (805) 963-9471	TCP/IP	Yes	IBM PC AT and compatibles	MS-DOS 3.1, Unix, VMS	Runs on top	No	Yes	File server	Yes	Yes	Yes	Ethernet, TCP/IP	$250 per node
Control Data Corp. (612) 853-6137	CDC Net	No	NA	NOS/VE 678, NOS 678	Integrated	NA	NA	NA	Yes	NA	NA	Host based	Contact vendor
Convergent Technologies, Inc. (408) 435-CVGT	PC Exchange/ Vines	Yes	Convergent S series, Server PC systems	MS-DOS 2.0 or higher on PC workstation and Unix System V, Release 2 on server	Runs on top	Yes	Yes	File server	Yes	Yes	Yes	Electronic mail, asynchronous terminal emulation, internetworked servers, distributed naming data base, network management, mail gateways, access to SNA 3270, Remote Job Entry, bisynchronous access to X.25 and TCP/IP networks	Contact vendor
	Clustershare	No	Ngen workstations	Supports MS-DOS 3.1 on PC workstations, CTOS on Ngen workstation	Runs on top	Yes	Yes	File server	Yes	Yes	Yes	User administers utilities, server resource management, tape backup and mail, access to dial-up and X.25 lines, Ethernet and SNA 3270	Contact vendor
Corvus Systems, Inc. (408) 281-4100	PC/NOS	Yes	Omninet, Token-Ring, Ethernet, Netbios, Arcnet, Microlan	MS-DOS, PC-DOS 2.0 to 3.3	Runs on top	No	Yes	File server	Yes	Yes	Yes	Electronic mail, asynchronous communications server	$695
Data General Corp. (800) DATAGEN	WTS	Yes	Starlan, Ethernet, Thin Ethernet	AOS/VS	Runs on top	Yes	Yes	File server	Yes	Yes	Yes	Terminal emulation	Contact vendor
Digital Equipment Corp. Contact local sales office	Decnet	Yes	3Com, Micom Ethernet boards	VMS, MS-DOS, Ultrix, Tops, RSTS/E, RT-11	Runs on top	Yes	No	Either	Yes	Yes	Yes	Electronic mail, videotext, Vaxnotes	$645 per node
Easynet Systems, Inc. (800) 387-3207	Easynet 2	Yes	Comport serial port	MS-DOS 3.1 or higher	Integrated	No	No	Standard pair-to-pair	NA	NA	Yes	None	$89 per node
Fox Research, Inc. (513) 433-2238	10 Net 4.0	Yes	—	MS-DOS 2.0 or higher	Runs on top	No	Yes	—	Yes	Yes	Yes	Electronic mail, news, calendar	$695 per fully configured node
Hewlett-Packard Co. (408) 725-8111	HP Officeshare	Yes	IBM PC, XT, AT, HP Vectra, HP Touchscreen PC	MS-DOS 3.1	Runs on top	Yes	No	File server	—	No	Yes	Virtual terminal to HP 3000 system, Electronic mail with HP 3000 system	$595-$895
IBM (800) IBM-2468	IBM PC Local-Area Network Program	No	PC Network baseband, broadband and Token-Ring	PC-DOS 3.1, 3.2, 3.3, 3270 PC Control Program Version 3, 270 Workstation Program Version 1	Runs on top	No	Yes	File server	No	Yes	Yes	Messaging, saving, retrieving, send same message, editing, forwarding a received message, skipping previously viewed messages in file log	Contact vendor
Icon International, Inc. (801) 225-6888	Unix System 4.2 BSD	Yes	All Unix devices	Unix 4.2 BSD, Unix V, Release 2, Tick, MS-DOS	Runs on top	No	Yes	Either	Yes	Yes	Yes	X.25, RS-422, Ethernet, SNA, Electronic mail	Included with hardware
Ideassociates, Inc. (617) 663-6878	Ideashare	Yes	—	MS-DOS up to 3.1, PC-DOS 2.1 to 3.1	Runs on top	—	No	File server	Yes	No	Yes	None	$595
Nestar Systems, Inc. (415) 469-1777	Plan series	No	Proprietary	MS-DOS 2.1, 3.1, 3.2, 3.3	Runs on top	No	Yes	Either	Yes	Yes	Yes	Electronic mail, multichannel asynchronous communications server	Bundled with hardware

The companies included in this chart responded to a recent telephone survey conducted by *Computerworld*. Further product information is available from vendors.

COMPANY	PRODUCT	HARDWARE INDEPENDENT	HARDWARE SUPPORTED	HOST OPERATING SYSTEM SUPPORTED	EMULATES OR RUNS ON TOP OF HOST OPERATING SYSTEM	USES MICROSOFT REDIRECTOR	FULL COMPATIBILITY WITH NETBIOS	DISK- OR FILE SERVER-BASED	HOST COMMUNICATION FOR NETWORK MANAGEMENT	SUPPORTS CONCURRENT SERVERS	FILE/RECORD LOCKING CAPABILITIES	ADDITIONAL CAPABILITIES	PRICE
Network Development Corp. (215) 296-7420	DNA Network	No	—	MS-DOS up to 3.3	Runs inside	Yes	Yes	File server	Yes	Yes	Yes	Electronic mail	Included with hardware
Network Systems Corp. (612) 424-4888	Netex	No	Hyperchannel	MVS/VM, Aegis, MCP, NOS/BE, SGOS, RSX, VMS, Berkeley Unix	Runs on top	No	Yes	File server	Yes	—	—	None	Contact vendor
Novell, Inc. (800) 453-1267	Advanced Netware	Yes	All major topologies on the market	MS-DOS 2.0 or higher	Either	No	Yes	File server	Yes	Yes	Yes	Electronic mail, bulletin board, asynchronous communications server, SNA Gateway, internal, external bridging to multiple LANs	$1,595-$4,490
The NTI Group, Inc. (408) 739-2180	Desnetbios TCP/IP	No	—	PC-DOS 3.1, Xenix	Runs on top	Yes	Yes	File server	Yes	Yes	Yes	None	Included with hardware
Orchid Technology, Inc. (415) 683-0300	PCNet/Advanced Netware	Yes	Supports 3 additional topologies	MS-DOS	Runs on top	No	Yes	File server	Yes	Yes	Yes	Electronic mail, remote dial-in	$895 for eight users, $1,595 for 100 users
Quadram Corp. (404) 923-6666	Netware 2.X 286	Yes	Quadnet6, Quadnet 9, other Novell-compatible hardware	MS-DOS, PC-DOS	Runs on top	No	Yes	File server	No	Yes	Both	Electronic mail, remote logon	$2,195
	Quadstar Tapestry	Yes	Quadstar, Starlan	PC-DOS 3.0	Runs on top	Yes	Yes	File server	No	Yes	Both	Electronic mail, remote access, mainframe, mini, modem sharing, telex	$1,095
Recoginition Equipment, Inc. (617) 272-6470	Redi	No	—	Unix V, Release 2	Runs on top	No	No	File server	Yes	Yes	Yes	None	From $5,000
The Software Link, Inc. (404) 448-5465	Lanlink	Yes	—	MS-DOS 3.2, 3.3 by 7/1/87	Runs on top	No	No	File server	Yes	Yes	Yes	Bulletin board remote access	From $495 for starter kit
3Com Corp. (408) 562-6508	3 Plus	No	—	MS-DOS 3.1, 3.2, 3.3	Runs on top	Yes	Yes	File server	—	Yes	Yes	Electronic mail, remote PC access, remote inter-networking, asynchronous gateways, 3270	$1,050-$2,100
Tiara Computer Systems, Inc. (415) 965-1700	Tiaralink Lanware	Yes	Tiaralink Arcnet Boards	MS-DOS 2.1, 3.0, 3.1, 3.2	Runs on top	No	Yes	Disk server	Yes	Yes	Yes	Electronic mail, gateways, Chat, Netbios	$500 per network
Torus Systems, Inc. (415) 363-2418	Tapestry	Yes	—	MS-DOS, PC-DOS 3.1, 3.2, 3.3	Runs on top	No	Yes	File server	Yes	Yes	Yes	Electronic mail, remote access, gateways, telephone management	$250 per node
TRW Information Network Division (213) 373-9161	OS Connection	Yes	Any Unix environment	Unix, VMS, Ultrix, MVS, MS-DOS, Xenix	Runs on top	Yes	Yes	NA	Yes	No	No	None	$395
Ungermann-Bass, Inc. (408) 496-0111	NET/One PC	Yes	Ungermann-Bass NIUPC, 3270 NIUPC	MS-DOS 3.1	—	Yes	Yes	Either, validation server	NA	Yes	NA	Initial program load, supports diskless workstation	$95 per node
Univation, Inc. (408) 263-1200	Lifenet	Yes	—	PC-DOS 3.1, MS-DOS 3.1	Emulates	No	Yes	File server	Yes	Yes	Yes	Electronic mail, messaging, on-line Help, calendar functions	$1,495
Waterloo Microsystems, Inc. (404) 441-9252	Port PC LAN Program	Yes	IBM Token-Ring, Arcnet	MS-DOS 2.0, 3.0, 3.1, 3.2, 3.3	Emulates	No	Yes	File server	No	Yes	Yes	Electronic mail, TTY, VT-100, IBM 3278, VT-52, internetworking, remote workstations, file transfers, Kermit, modem, no protocol transfer	$1,695 per 16-station LAN
	Waterloo Port	No	NA	PC-DOS 2.0 to 3.3	Emulates	No	Yes	Either	No	Yes	Yes	Port mail system, calculator	$1,695
Western Digital Corp. (800) 847-6181	Vianet	Yes	—	Unix, MS-DOS 2.0 or higher	Runs on top	Yes	Yes	—	No	Yes	Yes	Electronic mail	$140 per node
Wollongong Group, Inc. (415) 962-7200	WINS	Yes	—	Unix System V, MS-DOS 2.0 or higher, MPE-5, UTS, VMS, Towers, IX 370, MPE	Runs on top	—	Yes	File server	Yes	Yes	Yes	Electronic mail, mail transfer protocol	Contact vendor

Local-area network hardware

COMPANY	PRODUCT	NETWORK OPERATING SYSTEM	TOPOLOGY	CABLING SCHEME(S) SUPPORTED	ACCESS SCHEME	MAXIMUM CONNECTION DISTANCE	WORKSTATIONS SUPPORTED (AVERAGE)	ON-BOARD COPROCESSOR	RAW BIT RATE	BOARD-TO-HOST TRANSFER METHOD	BUS INTERFACE WIDTH	PRICE
Able Computer, Inc. (714) 979-7030	Attach	Proprietary	Hierarchical star	Twisted-pair, fiber-optic	Noncontention	100 miles	3,000	Yes	20M bit/sec.	Shared memory	32 bits	Contact vendor
Agile Systems, Inc. (214) 242-4307	Agilenet 20 series	Sytek System 2000	Bus	Twisted-pair, fiber-optic, broadband, wireless	CSMA/CD/CA	70 miles	2,000	Yes	128K bit/sec.	I/O port	8 bits	$495
	AN 20 series	Sytek System 2000	Bus	Twisted-pair, fiber-optic, broadband, wireless	CSMA/CD/CA	70 miles	2,000	NA	128K bit/sec.	Any serial I/O software	NA	$750-$1,120
Allen-Bradley Co. (216) 449-6700	Data Highway	Data Highway (proprietary)	Linear bus	Baseband twin-axial	Token passing	10,000 ft	64	Yes	57K bit/sec.	Varies	Varies	From $1,500
	Data Highway II	Data Highway II (proprietary)	Linear bus	Carrierband coaxial	Token passing	7,700 ft	35 to 40	Yes	1M bit/sec.	Varies	Varies	From $3,500
	Vistalan/PC	Novell Advanced Netware, Vines	Bus	Broadband coaxial	Token passing	14-mile diameter	255 workstations per channel	No	2.5M bit/sec.	Shared I/O port	8 bits	$695 per card
	Vistalan/1	LAN/1 (proprietary)	Bus	Broadband coaxial	Token passing	14-mile diameter	2,000 workstations per channel	Yes	2.5M bit/sec.	Serial RS-232 ports	NA	From $1,000
	Vistalan/3	Proprietary, Ethernet-based	Bus	Baseband coaxial	Contention	1,500 meters	2,000+ workstations per network	Yes	10M bit/sec.	Serial RS-232 ports	NA	From $2,800
	Vistamap	Real-Time Editor (proprietary)	Bus	Broadband coaxial	Token passing	10 miles	2,000+ workstations per channel	Yes	10M bit/sec.	Varies	Varies	Contact vendor
	Vistamap	—	Bus	Carrierband coaxial	Token passing	3,000 ft	32	Yes	5M bit/sec.	Varies	Varies	Contact vendor
Apple Computer, Inc. (408) 973-2222	Appletalk	Serial bus	Twisted-pair, shielded	Carrier-sent multiple access/collision avoidance	1,000 ft	32 miles max	—	No	230.4K bit/sec.	Shared memory	—	$50 per connection
Applied Knowledge Groups, Inc. (800) 443-1254 (800) 422-1254 (Calif.)	Knowledge Network	—	Bus	Twisted-pair	CSMA	1,000 ft	6	NA	1.15M bit/sec.	NA	NA	$149.50 per station
Applitek Corp. (617) 246-4500	Unilan	PSOS	Bus	Fiber-optic, broadband, baseband	Unilink (dedicated, contention)	30 miles	600+	Yes	10M bit/sec.	NA	16 or 32 bits	From $6,000
	EI 10 series	PSOS	Bus	Fiber-optic, broadband, baseband	Contention	2.5 km	100+	Yes	10M bit/sec.	NA	16 or 32 bits	From $2,600
Architectural Communications Co. (ACI) (617) 898-2500	Starbus	Proprietary	Topology independent	Twisted-pair	Polling	7,000 ft	12	No	115.2K bit/sec.	NA	External board	$300
Asher Technologies, Inc. (800) 334-9339	Ashernet VI	Novell Advanced Netware	Contention DVS network	Coaxial	Contention	2,000 ft	6	No	1.7M bit/sec.	Shared memory	8 bits	$525
	Ashernet IX	Novell Advanced Netware	Cluster of stars	Dual twisted-pair (IBM Type 1 or 6)	Token-ring	200 ft	256	No	10M bit/sec.	Shared I/O ports	8 bits	$795
AST Research, Inc. (714) 863-1480	Starsystem	Netbios, AST Advanced Netware	Daisy chain, star, bus	Twisted-pair	CSMA/CD	400 ft (up to 8,000 ft with 5 hubs)	64	No	1M byte/sec.	Twisted-pair	8 bits	$695 per starter kit
	Resource Sharing Network	Netbios, AST Advanced Netware	Daisy chain, star, bus	Coaxial	CSMA/CD	1,500 to 2,500 ft (depending on cabling)	64	No	5M byte/sec.	Coaxial	8 bits	$995 per starter kit
AT&T (800) 247-1212	Starlan	AT&T (proprietary)	Star	Unshielded twisted-pair	Contention CSMA/CD	800 ft	1,200 max	No	1M bit/sec.	—	32 bits	$395 (network access unit), $125 (network access software)
Avatar Technologies, Inc. (617) 435-6872	Alliance ZSL	Proprietary	Star	Twisted-pair	CSMA/CD	500 ft from central server	20	No	115.2K bit/sec.	NA	16 bits	$1,195-$1,995
BMB Compuscience Ltd. (416) 876-4741	Imaginet	—	Hierarchical bus	Twisted-pair	Polled system	Up to 2,000 ft without repeaters	20 to 30	Yes	2M bit/sec.	Direct memory access	8 bits	$750 per card
Bridge Communications, Inc. (415) 969-4343	CS/200 Communications Server	—	Bus (Ethernet), tree (broadband)	Twisted-pair, baseband fiber-optic, broadband coaxial, baseband coaxial, thin Ethernet	CSMA/CD	2.5K km (Ethernet), 5 miles (broadband)	10	Yes	200K bit/sec.	RS-232 ports	NA	$280 per node
	CS/1 Communications Server		Bus (Ethernet), tree (broadband), token-ring (ring)	Twisted-pair, baseband fiber-optic, broadband coaxial, baseband coaxial, token-ring, thin Ethernet	CSMA/CD, token passing	2.5 km (Ethernet), 5 miles (broadband)	64	Yes	60K bit/sec.	RS-232, 3270 coaxial	NA	$250 per node
Centram Systems West, Inc. (415) 549-5900	TOPS	TOPS	Bus	Twisted-pair	CSMA/CA	1,000 to 3,000 ft	7 to 12	No	230K bit/sec.	Direct memory access	8 bits	$149-$389 per node
Classic Technology Corp. (800) 392-8324	Classic AT Multiuser System	MS-Net	Star	RS-422	Direct connect	500 ft	6	No	16 bit/sec.	Bus	16 bits	$995 per user
	Classic XT Multiuser System	MS-Net	Star	RS-422	Direct connect	500 ft	5 or 6 per network	Yes	16 bit/sec.	Bus	8 bits	$995 per user

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Standardize

FROM PAGE S14

realistically cover all the possible combinations of existing standards. Challenges include deciding which architecture to support and the complementary services to offer.

To further complicate matters, until an industrywide set of standards is adopted, those decisions must be periodically reevaluated as new, intermediate standards emerge and others fade. The ability to predict these changes in the marketplace will remain important to the independent LAN vendor for some time.

Based on the most recent trends in the industry, three to four standards will become dominant in the short term. For example, in the area of architectures, Transmission Control Protocol/Internet Protocol and LU6.2 are expected to remain strong, while among the various wide-area network standards, the CCITT X.25 standard will most likely dominate. In addition, the Token-Ring network, Manufacturing Automation Protocol/Technical and Office Protocol (MAP/TOP), Ethernet and Netbios are emerging as key LAN standards. Twisted-pair, fiber-optic and broadband cabling will remain the most important physical media.

> THE purpose of a standard is to provide commonality among a variety of solutions and to simplify connectivity.

The job of a standard is not to solve all problems, provide the best technical approach or even offer the most cost-effective solution. Instead, the purpose of a standard is to provide commonality among a variety of solutions and to simplify connectivity. In other words, a standard is a basis for creating a complete networking scheme to address specific environments.

By combining the best of several other standards, ISO today effectively forms a foundation on which to build complete systems. For example, although the ISO standard has not yet been fully completed, the existing elements of the standard were used to create the foundation for the MAP/TOP movement.

A forced standard

The ISO standard offers some important advantages over other alternatives. ISO has remained as a viable choice for a much longer period than the other potential candidates, and it has the support of the vendor community through the Corporation for Open Systems.

Perhaps the most important reason for adopting the ISO standard is that the price of not doing so will be a different — possibly inferior — standard forced upon the industry by users.

Users have not only taken control but are hastening the search for standards, primarily because connectivity has become a critical issue. The problem has become so acute that in some cases, users have banded together to develop their own standards and use their purchasing power to impose their choices on LAN vendors. One example of this is the automobile industry, which, led by General Motors Corp., is developing its own standard, MAP, for factory applications.

Many vendors no[w] [fe]ar that the need for c[om]mon applications will force LA[N] builders to adopt an undesirable or difficult-to-implement set of standards. The only way to avoid such a situation is for the LAN community to rally behind a solid LAN standard foundation — such as ISO — and commit the time, personnel and money necessary to guarantee its adoption.

When complete, ISO, or any other standard, will still provide only a starting point for network builders and not a complete solution.

Having that foundation — that common mentality — on which to build will, however, provide more direction and better connectivity than the set of independent standards with which the industry has struggled. •

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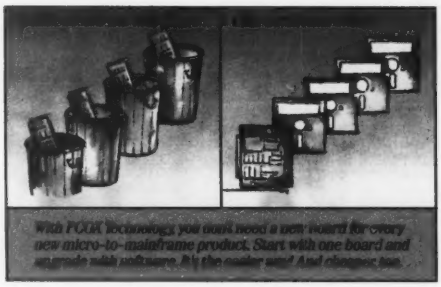

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Which left the users thirsty for more power. They wanted to interact with corporate data bases. Use multiple host sessions. Get into mainframe graphics. Do all this over the phone. Or from a LAN.

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So CXI gave it to them. With PCOX Technology. A modular system of micro-to-mainframe products that helps manage PC demands for mainframe access.

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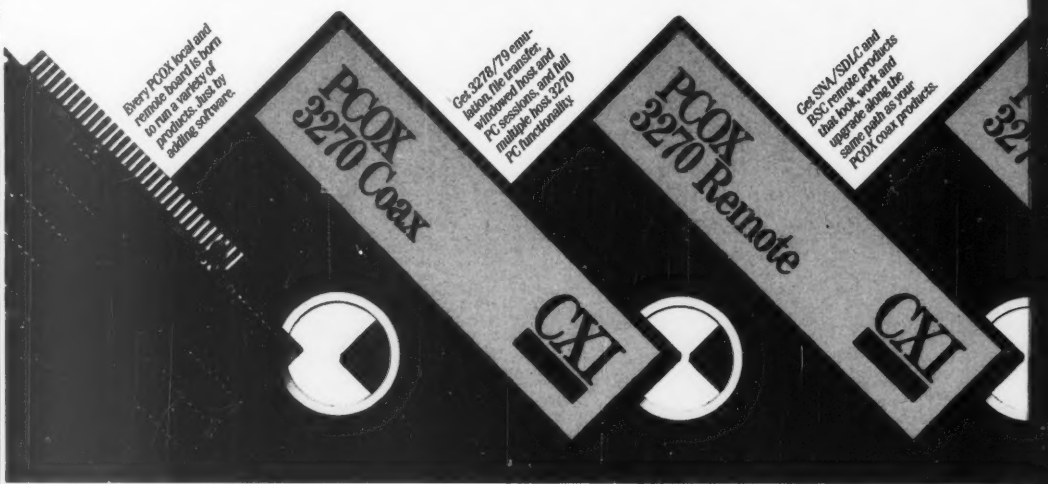
Every PCOX local and remote board is born to run a variety of products. Just by adding software.
PCOX 3270 Coax
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PCOX 3270 Remote
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Get SNA/SDLC and BSC remote products that look, work and upgrade along the same path as your PCOX coax products.

Users gain

FROM PAGE S15

Systems Interconnect (OSI) architecture and industry standards. Companies inclined to protect customers' interests will be staunch supporters of ISO and will base products and growth plans on these standards.

The ISO model can be divided into three principal categories: wires to achieve connection, protocol software to achieve communications and networking and applications software to complete the solution.

Ethernet and IBM Token-Ring network technologies made available on standard installed phone wiring are the clear standards in the wires category. Users should not buy a desktop workstation, network or workgroup computing system unless it is based on these two standards. Apple Computer, Inc.'s Appletalk is a third specialty standard for applications such as work-group publishing, in which the Macintosh is a strong performer.

Connectivity is defined as "connection and communication." Ethernet and the Token-Ring network provide that connection. An example of connection and communication could be a telephone call from the U.S. to Japan. When the phone is answered, you have a connection. But unless you speak Japanese, you do not have communication. Standards offer us the capability of "speaking" Japanese or whatever language is spoken and understood at the other end of our connection.

The art of communications is the function of certain networking protocols, and today, we are confronted with many proprietary ones. However, the clear direction of the industry is toward IBM's LU6.2 and, for the rest of us, OSI.

The critical sector of the ISO model is the one in which applications software resides. The art of writing applications software is influenced by standards, because software publishers want to have a large base of potential users for their products. The key standards for applications compatibility are Microsoft Corp.'s Network (MS-Net) Redirector and IBM's Netbios.

File-system compatibility

File-system compatibility is also important to allow applications to share information, or files, among different machines. This is where the standards wars are currently raging. While Microsoft's Server Message Block file system is established as the industry standard for Microsoft MS-DOS, IBM PC-DOS and the recently introduced IBM Operating System/2, there are many proprietary workstation file systems to confuse the user.

Two file systems are on the verge of becoming standards. These are the ISO-endorsed FTAM, which can be used with most industry-standard computers, and Distributed Office Support System for IBM machines. It is my belief that successful applications software will be written for at least one, if not all three, of these systems.

A cautionary note: Users should beware of systems suppliers offering applications compatibility but not file-system compatibility. Roughly 75% of the industry has file-system compatibility with one or more of the three standards mentioned above. This group, which includes the industry's top tier, can thus share applications. The remaining 25% of the industry is locked out from talking to these systems.

It is important that users understand this before making purchasing decisions. There is really no good reason to choose a proprietary networking system and turn your back on the systems and software available from the industry leaders.

While some companies continue to push proprietary approaches, customers are casting their votes in favor of industry standards. Companies that design and manufacture to industry standards are facilitating connectivity among the products from the major computer equipment and software suppliers. This can only lead to better products, enhanced productivity, increased functionality and lower costs. In short, the customer wins. That's what standards are all about. •

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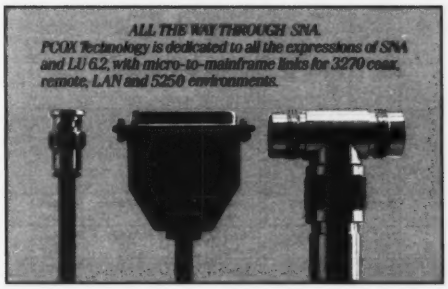
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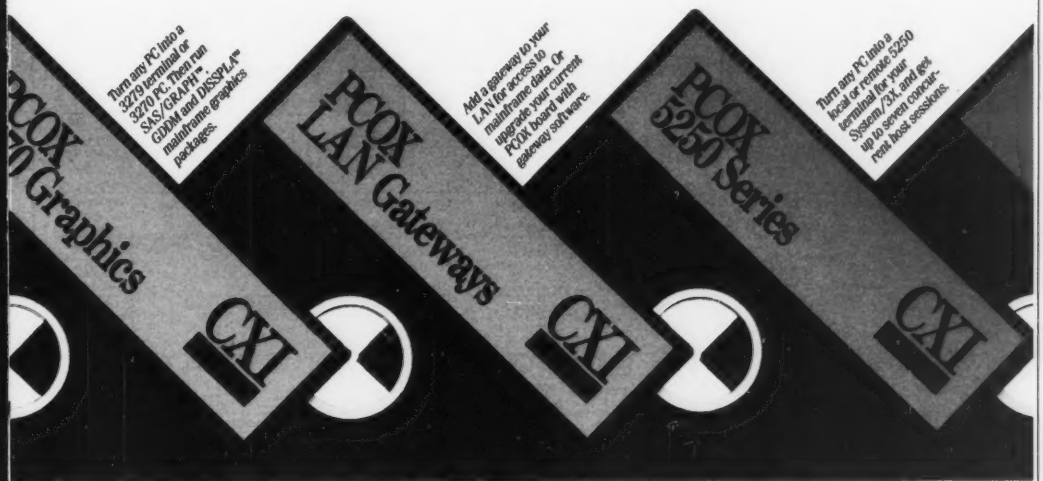
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Turn any PC into a local or remote 5250 terminal for your System/36, and get up to seven concurrent host sessions.
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COMPANY	PRODUCT	NETWORK OPERATING SYSTEM	TOPOLOGY	CABLING SCHEME(S) SUPPORTED	ACCESS SCHEME	MAXIMUM CONNECTION DISTANCE	WORKSTATIONS SUPPORTED (AVERAGE)	ON-BOARD COPROCESSOR	RAW BIT RATE	BOARD-TO-HOST TRANSFER METHOD	BUS INTERFACE WIDTH	PRICE
Codenoll Technology Corp. (914) 965-6300	Codenet-3061	—	Star	Fiber-optic star	Collision avoidance	Varies	27,000 max	No	Software dependent	8-bit I/O	8 bits	$1,195
	Codenet-3051	—	Star	Fiber-optic	CSMA/CD	1 km	500	No	8M bit/sec.	Direct memory access	8 bits	$995
	Codenet-34XX	—	Star	Fiber-optic star	Collision avoidance	Variable	Up to 1,000	No	10M bit/sec.	8-bit bus	8 bits	$1,795
Codex Corp. (617) 364-2000	Codex 4000 series LAN	Codex NOS	Distributed bus, star	Baseband	CSMA/C, CSMA/CA	2.5 km	30 to 60	NA	10M bit/sec.	NA	NA	$249 per port
Communication Machinery Corp. (805) 963-9471	ENP series (VMEbus, Multibus, Unibus, Q-bus, PC AT)	NA	Bus	Baseband	CSMA/CD	50 meters	100	Yes	10M bit/sec.	Shared memory	32 bits	$2,300
Complexx Systems, Inc. (205) 830-4310	XLAN	—	Bus	Baseband	Contention	8,000 ft	100	No	1M bit/sec.	NA	8 bits	$295 per port
Control Data Corp. (612) 853-6137	CDCnet	NOS/VE 678, NOS 678	Linear bus	Broadband, baseband	Contention, 802.3 Ethernet	1.5 km	5,000	NA	10M bit/sec.	Shared I/O port	NA	$7,400-$13,000
Convergent Technologies, Inc. (408) 434-CVGT	EC-501 (VMEbus), CB-510 (proprietary bus)	PC Exchange, Vines	Linear bus	Baseband (standard or thin Ethernet cabling)	CSMA/CD, 802.3	1 km (Ethernet), 1,000 ft (thin Ethernet)	12 to 64	Yes	10M bit/sec.	Direct memory access	32 bits	Contact vendor
	Clustercard	Clustershare	Linear multidrop	Shielded or unshielded twisted-pair	Poling-based, no collisions	1.2 km	4 to 30	No	1.8M bit/sec.	Direct memory access	8 or 16 bits	Contact vendor
Corvus Systems, Inc. (408) 281-4100	Omninet	Novell, Advanced Netware, PC NOS, Constellation, Netbios	Star, bus	Twisted-pair	CSMA/CA	4,000 ft	5 to 10	Yes	1M bit/sec.	Direct memory access, shared I/O port, dual-port RAM	8 bits	$199 per card
Data General Corp. (800) DATAGEN	DG/Starlan	WTS, XTS	Bus	Unshielded twisted-pair	Contention	4,800 ft	1,024 max	No	1M bit/sec.	Direct memory access	8 or 32 bits	Contact vendor
	Ethernet	WTS/XTS	Bus	Baseband	Contention	200, 500 meters	—	No	10M bit/sec.	Direct memory access	8 or 32 bits	Contact vendor
Digital Equipment Corp. Contact local sales office	—	Decnet	Bus	Fiber-optic, baseband, broadband	Contention, CSMA/CD	Up to 13.5 miles	1,063 max	Yes	10M bit/sec.	Shared memory	16 or 32 bits	$645 per station
Easynet Systems, Inc. (800) 387-3207	Easynet 116	Proprietary	Extended bus	Twisted-pair	VT CSMA/CD/CA	2,000 ft	Up to 250	No	2M bit/sec.	Direct memory access	16 bits	$595 per PC connection
Exelan, Inc. (800) EXCELAN	Exos 200, 300 series Intelligent Ethernet controllers	—	Bus	Ethernet 802.3	CSMA/CD	2.5 km	1,024 max	Yes	10M bit/sec.	Direct memory access	8 bits	Contact vendor
Fibercom, Inc. (703) 342-6700	Whisperlan	NA	Ring	Fiber-optic	Ethernet	2 km between nodes	1,024 max	No	10M bit/sec.	NA	NA	$895 per node
Fibronics International, Inc. (617) 778-0700	KNet/PC	—	Linear bus	Fiber-optic, coaxial	CSMA	3.5 km	100	Yes	10M bit/sec.	Bus	16 bits	$890
	Filan	—	Linear bus	Fiber-optic, coaxial	CSMA	3.5K meters	100	Yes	10M bit/sec.	BMC	NA	$20,000-$60,000
Fortune Systems Corp. 800-FORMULA	Fortune:Link	—	Token bus, tree	Baseband	Token-ring	4 miles	30	Yes	2.5M bit/sec.	Direct memory access	16 bits	$1,495
Fox Research, Inc. (513) 433-2238	10-Net Starlan Board	10-Net	Bus	Twisted-pair cable	CSMA/CA	2,000 ft without repeaters	10	No	1M bit/sec.	Direct memory access	8 bits	$695 bundled
Hewlett-Packard Co. (408) 725-8111	HP Thinlan	HP Officeshare	Bus	802.3, Ethernet baseband	CSMA/CD	655 km	30 per segment	No	10M bit/sec.	Shared memory	8 or 16 bits	$895
	HP Starlan	HP Officeshare	Distributed star	802.3, unshielded twisted-pair, baseband	CSMA/CD	1 km	50	No	1M bit/sec.	Direct memory access	8 or 16 bits	$595
IBM (800) IBM-2468	PC Network Adapter	PC LAN Program Version 1.2	Linear bus	Broadband	CSMA/CD	1,000 ft radius	251 to 1,000	Yes	2M bit/sec.	Direct memory access	8 bits	$880 per fully configured node
	PC Network Adapter II	PC LAN Program Version 1.2	Linear bus	Broadband	CSMA/CD	1,000 ft radius	251 to 1,000	No	2M bit/sec.	Shared memory	8 bits	$880 per fully configured node
	PC Network Adapter II/A	PC LAN Program Version 1.2	Linear bus	Broadband	CSMA/CD	1,000 ft radius	251 to 1,000	No	2M bit/sec.	Shared memory	8 bits	$880 per fully configured node
	PC Network Baseband	PC LAN Program Version 1.2	Daisy chain or star	Baseband	CSMA/CD	200 ft (daisy chain), 400 ft (star)	80 max	—	2M bit/sec.	—	8 bits	$880 per fully configured node
	PC Network Baseband/A	PC LAN Program Version 1.2	Daisy chain or star	Baseband	CSMA/CD	200 ft (daisy chain), 400 ft (star)	80 max	—	2M bit/sec.	—	8 bits	$880 per fully configured node
	Token-Ring Adapter	PC LAN Program Version 1.2	Star, ring	Baseband	Token passing	975 ft between terminals	260	Yes	4M bit/sec.	Shared RAM	8 bits	$1,032.50 per fully configured node
	Token-Ring Adapter II	PC LAN Program Version 1.2	Star, ring	Baseband	Token passing	975 ft between terminals	260	Yes	4M bit/sec.	Shared RAM	8 bits	$1,032.50 per fully configured node
	Token-Ring Adapter II/A	PC LAN Program Version 1.2	Star, ring	Baseband	Token passing	Up to 975 ft between terminals	260	Yes	4M bit/sec.	Shared RAM	8 bits	$1,032.50 per fully configured node
Icon International, Inc. (801) 225-6888	Main CPU	—	286 board supported by Unix-based diskette processor	Arcnet, 3+, Proteon	Novell	Varies	10 to 15	Yes	64M bit/sec.	Shared memory	NA	$30,000 (included with hardware)
Ideassociates, Inc. (617) 663-6878	Ideanet	PC operating system	Bus	Coaxial, baseband	Bidirectional	2,000 ft	10 to 15	No	800K bit/sec.	Direct memory access	8 bits	From $1,195

COMPANY	PRODUCT	NETWORK OPERATING SYSTEM	TOPOLOGY	CABLING SCHEME(S) SUPPORTED	ACCESS SCHEME	MAXIMUM CONNECTION DISTANCE	WORKSTATIONS SUPPORTED (AVERAGE)	ON-BOARD COPROCESSOR	RAW BIT RATE	BOARD-TO-HOST TRANSFER METHOD	BUS INTERFACE WIDTH	PRICE
Integrated Marketing Corp. (800) 537-5999	The Data Manager Plus 256	—	RS-232	RS-232 asynchronous	RS-232	250+ ft	5 to 250	Yes	1,200 to 38.4K bit/sec.	Stand-alone	7 or 8 bits	From $495
Intelligent Technologies International Corp. (415) 345-6666	Invisinet	Novell Advanced Netware, PC Network, Tapestry, PC LAN	Bus	Twisted-pair, baseband	Heartbeat collison avoidance	1,000 ft	45	No	1.8M bit/sec.	Direct memory access	8 bits	$299-$399
Intercontinental Micro Systems Corp. (714) 630-7964	LAN PC	Novell Advanced Netware	Arcnet	Coaxial, baseband	Token-ring	2,500 ft	12	No	2.5M bit/sec.	Direct memory access	8 bits	$395
	CPS-PC	Novell Advanced Netware	Bus	RS-232, RS-422	Asynchronous	200 to 4000 ft	6	Yes	38.4K bit/sec.	Direct memory access interrupt driven	8 bits	$1,095
	Node-Z100	Novell Advanced Netware	Arcnet	Coaxial, baseband	Token-ring	2,500 ft	16	No	2.5M bit/sec.	Bus	8 bits	$495
Kantek, Inc. (800) 521-0714	Kannet	Kannet Operating System	Segmented ring	Twisted-pair, coaxial, baseband	Modified store foreward	30,000 ft	20 nodes	Yes	2M bit/sec.	Shared RAM	8 bits	$1,750
Kimtron Corp. (800) 828-8899	SAT20 Netstation	—	Linear bus	Baseband	Heartbeat	1,000 ft	8	Yes	2M bit/sec.	Direct memory access	8 bits	From $995
Kinetics, Inc. (415) 947-0998	EtherSC	—	Gateway	Baseband	CSMA/CD	200 to 2.5 km	Stand-alone	Yes	10M bit/sec.	SCSI	8 bits	$995-$1,250
	Fastpath	—	Gateway	Baseband	CSMA/CD, CSMA/CA	300 to 2.5 km	32	Yes	230.4K, 10M bit/sec.	NA	8 bits	$2,500-$2,750
Lanex Corp. (301) 595-4700	Broadband LAN	—	Bus	Broadband, dual, midsplit	—	22 miles	1000 to 2000 per channel	No	2M bit/sec. on 6-MHz channel	NA	8 or 16 bits	$225 per port
Micom/Interlan, Inc. (617) 263-9929	NI5010 Network Interface	Novell Advanced Netware	Bus	Baseband	CSMA/CD	2.5 km	User-defined	No	10M bit/sec.	Direct memory access	8 bits	$450-$495
	NTS 100 Network Terminal Server	NA	Bus	Baseband	CSMA/CD	2.5 km	8	Yes	10M bit/sec.	Direct memory access	NA	$2,900
	NP600 Network Protocol Processor	Novell Advanced Netware	Bus	Baseband	CSMA/CD	2.5 km	User-defined	Yes	10M bit/sec.	Direct memory access	8 bits	$895
NBI, Inc. (303) 938-2548	NBI Net	NA	Bus	Ethernet coaxial cable, 802.3	CSMA/CD	2.5 km	30 to 40	Yes	10M bit/sec.	Direct memory access	—	$500-$700 per connection
Nestar Systems, Inc. (415) 469-1777	Plan series PC adapter cards	Proprietary	Starburst bus system or tree	IBM cabling system, twisted-pair, RG62 coaxial, fiber-optic, broadband, backbone	Token passing	6 miles, 2,000 ft hub-to-hub	80	No	2.5M bit/sec. (Arcnet), 4M bit/sec. (token-ring)	Direct memory access	16 bits	$495-$895
Network Development Corp. (215) 296-7420	DNA Networks Product II	Proprietary	Multidrop star	Twisted-pair	Polling	5,000 ft	64	Yes	2.5M bit/sec.	Shared I/O port	8 bits	$1,090
Network Systems Corp. (612) 424-4888	Hyperchannel	Proprietary, ISO-based	Bus	Twisted-pair, fiber-optic, coaxial, T1, T3, satellite, baseband	CSMA/CA	Unltd.	50 to 500	Yes	10M to 200M bit/sec.	Direct memory accesss, channel to channel	NA	Contact vendor
	Hyperbus	Proprietary, ISO-based	Bus	All common cables	CSMA/CA	5,000 ft	Unltd.	No	10M bit/sec.	Shared I/O port	NA	Contact vendor
Northern Telecom, Inc. (408) 988-5550	Lanstar PC	MS-Net	Physical star, logical bus	Twisted-pair	—	4,000 ft	32 to 1,344 PCs	No	2.56M bit/sec.	Direct memory access	8 bits	$700-$800 per node
Novell, Inc. (800) 453-1267	Netware RX-Net	Novell Advanced Netware	Distributed star	Baseband	Token passing	20,000 ft	255 max	No	2.5M bit/sec.	Direct memory access	8 bits	$350 per card
	NP600	Novell Advanced Netware	Linear bus	Broadband	Contention	1 km without repeaters	100 nodes per segment max	Yes	10M bit/sec.	Shared memory	16 bits	$895 per card
	Netware Ethernet	Novell Advanced Netware	Linear bus	Broadband	Contention	1 km without repeaters	100 nodes per segment max	No	10M bit/sec.	Shared memory	8 bits	$395 per card
	Network Interface Card	Novell Advanced Netware	Star	Baseband	NA	500 to 4,500 ft (depending on cable)	—	No	600K bit/sec.	Dual port, shared memory	8 bits	$250 per card
	Intelligent NIC	Novell Advanced Netware	Star	Baseband	NA	500 to 4,500 ft (depending on cable)	100 nodes per segment max	Yes	600K bit/sec.	Dual port, shared memory	8 bits	$395 per card
The NTI Group, Inc. (408) 739-2180	Desnet	Tapestry	Bus	Broadband, baseband	CSMA/CD	15,000 to 30,000 ft	22 nodes	Yes	2M bit/sec.	Dual port	8 bits	$495 per node
	Ethernet	Tapestry	Bus	Baseband	CSMA/CD	9,800 ft	20	Yes	10M bit/sec.	Dual port	8 or 16 bits	$595 per node
Orchid Technology, Inc. (415) 683-0300	PCNet	--	Distributed bus	Coaxial baseband	CSMA/CD	7,000 ft	8	No	1M bit/sec.	Direct memory access	8 bits	$495
Prime Computer, Inc. (800) 343-2540	LAN300	Proprietary, Ethernet-based	Bus	Baseband	CSMA/CD	3 km	25	Yes	10M bit/sec.	Direct memory access	16 bits	From $5,000
	Ringnet	Proprietary	Ring-based	Baseband	Token passing	3 km	25	Yes	10M bit/sec.	Direct memory access	16 bits	From $5,000
Proteon, Inc. (617) 898-2800	Pronet-10	Novell Advanced Netware, Vines	Distributed star	Fiber-optic, broadband, baseband, microwave, infrared	Token-ring	Unltd.	15 nodes	No	10M bit/sec.	Direct memory access, shared I/O port	8 bits	$799
	Pronet-4	Novell Advanced Netware, Vines, PC LAN Program	Distributed star	Fiber-optic, broadband, baseband, microwave	Token-ring	2 km per link	15 nodes	No	4M bit/sec.	Direct memory access, shared I/O port, shared memory	8 or 16 bits	$695
	Pronet-80	NA	Star-shape token-ring	Shielded twisted-pair, fiber-optics	Token passing	2 km (on fiber)	240 max	No	80M bit/sec.	Direct memory access	8 or 32 bits	$5,000-$8,000
Sunol Systems, Inc. (415) 484-3322	Sunnet	3+, Appletalk, Novell Advanced Netware	Star	Flat baseband	Token-ring	400 ft per connection	10 to 31	Yes	7.5M bit/sec.	Direct memory access	8 or 16 bits	$175

COMPANY	PRODUCT	NETWORK OPERATING SYSTEM	TOPOLOGY	CABLING SCHEME(S) SUPPORTED	ACCESS SCHEME	MAXIMUM CONNECTION DISTANCE	WORKSTATIONS SUPPORTED (AVERAGE)	ON-BOARD COPROCESSOR	RAW BIT RATE	BOARD-TO-HOST TRANSFER METHOD	BUS INTERFACE WIDTH	PRICE
Sytek, Inc. (415) 966-7400	System 6000	Novell Advanced Netware, Univation Lightnet, PC LAN Program	Tree	Broadband	CSMA/CD	5 km	—	Yes	2M bit/sec.	Shared memory	32 bits	From $495
	System 2000	—	Tree	Broadband	CSMA/CD	50 km	500	Yes	158K bit/sec.	Shared I/O port	32 bits	$1,250
3Com Corp. (408) 562-6508	Etherlink Plus	3+, Novell Advanced Netware	Bus	Baseband	Contention, 802.3 CSMA/CD	8,500 ft with repeaters	1,024 max	Yes	10M bit/sec.	Direct memory access, shared I/O	8 or 16 bits	$895 per node
	Etherlink II	3+	Bus	Baseband	Contention, 802.3 CSMA/CD	8,500 ft with repeaters	1,024 max	No	10M bit/sec.	Direct memory access, shared memory, shared I/O	8 bits	$495 per node
	Etherlink	3+, Novell Advanced Netware, Decnet DOS	Bus	Baseband	Contention, 802.3 CSMA/CD	8,500 ft with repeaters	1,024 max	No	10M bit/sec.	Direct memory access, shared I/O	8 bits	$495 per node
	Tokenlink	3+	Logical ring, physical star or logical ring, physical bus	Broadband	Token-ring	1,260 (shielded), 330 ft. (unshielded)	260 (shielded), 72 (unshielded)	Yes	4M bit/sec.	Direct memory access, shared I/O port, Busmaster mode	8 or 16 bits	$650 per node
	Tokenlink Plus	3+	Logical ring, physical star or logical ring, physical bus	Broadband	Token-ring	1,260 (shielded), 330 ft. (unshielded)	260 (shielded), 72 (unshielded)	Yes	4M bit/sec.	Direct memory access, shared I/O port, Busmaster mode	8 or 16 bits	$895 per node
Tiara Computer Systems, Inc. (415) 965-1700	Tiaralink Lancard	Tiaralink Lanware, Novell Advanced Netware	Distributed star	Baseband	Token passing (Arcnet)	20,000 ft	255 max	No	2.5M bit/sec.	Memory-mapped I/O	8 bits	$495-$1,295
Tienet, Inc. (303) 444-2600	Tienet	—	Bus	Coaxial, baseband	CSMA/CD	5 miles	1,000	Yes	1M bit/sec.	RS-232	Serial	$600-$800
TRW Information Network Division (213) 373-9161	ACU-2000	OS Connection	Bus	Broadband, Ethernet baseband	CSMA/CD	10 miles	1,024	Yes	10M bit/sec.	RS-232	8 bits	$1,695
	ICU-2000	Proprietary	Bus	Broadband	CSMA/CA	10 miles	500	Yes	2M bit/sec.	RS-232	8 bits	$1,195
	PCU-2001	Vines	Token-bus	Broadband	Token-bus	10 miles	256 per channel (up to 6 channels)	No	2.5M bit/sec.	Direct memory access	8 bits	$645
	PC-ELink	Vines	Bus	Ethernet	CSMA/CD	500 meters	1,024	Optional	10M bit/sec.	Direct memory access	8 bits	$495
Ungermann-Bass, Inc. (408) 496-0111	Personal NIC	Net/One, MS-Net	Star, bus	Fiber-optic, broadband, baseband	CSMA/CD	500 meters	1 per board	No	10M bit/sec.	Shared memory	8 bits	$595 (baseband), $1,245 (broadband)
	Personal NIV Token Ring	Net/One	Ring	Twisted-pair	Token passing	500 meters	1 per board	Yes	4M bit/sec.	Shared memory	8 bits	$895
	Personal NIV	Net/One, MS-Net	Star, bus	Fiber-optic, baseband, broadband	CSMA/CD	500 meters	1 per board	Yes	10M bit/sec.	Shared memory	8 bits	$895 (baseband), $1,750 (broadband)
	NIVPC	Net/One PC	All	Twisted-pair, fiber-optic, baseband, broadband	Token-ring, token passing, CSMA/CD	500 meters	1 board per workstation, supports 96 Netbios sessions	Yes	5M bit/sec. (broadband), 10M bit/sec. (baseband)	Shared memory	16 bits	$1,095 (baseband), $1,745 (broadband)
	3270 NIVPC	Net/One PC	All	Twisted-pair, fiber-optic, broadband, baseband	Token-ring, token-bus, CSMA/CD	500 meters	1 board per workstation, supports up to 32 Netbios sessions	Yes	5M bit/sec. (broadband), 10M bit/sec. (baseband)	Shared memory	16 bits	$1,495 (baseband), $2,145 (broadband)
Univation, Inc. (408) 263-1200	Lifelink Ethernet-TCP/IP Network Interface	Lifenet	Bus	Baseband	Contention	1,000 ft	10	Yes	10M bit/sec.	—	8 bits	$595
Wang Laboratories, Inc. (617) 459-5000	Wangnet	NA	Bus	Twisted-pair, fiber-optic, broadband coaxial	CSMA/CB, Polling, modified token passing	12 miles	Hundreds	NA	10M bit/sec.	NA	NA	From $250 per user
Western Digital Corp. (800) 847-6181	Starlink	—	Star or daisy chain	Twisted-pair, baseband	Contention	800 ft between hubs, 11 max connections	—	No	1M bit/sec.	Direct memory access	8 bits	$324
	Starcard	All	Star	Twisted-pair, baseband	Contention	800 ft	—	No	1M bit/sec.	Direct memory access	8 bits	$249
	Starhub	All	Star	Twisted-pair baseband	Contention	800 ft	10 to 40	No	1M bit/sec.	NA	NA	$495
Xyplex, Inc. (617) 371-1400	Xyplex Distributed Network Processing System	—	Bus	—	—	—	—	—	—	—	—	Contact vendor
Zenith Electronics Corp. (Communications Products Group) (312) 699-2199	Z-LAN 500 Family	Novell Advanced Netware	Virtual bus	Coaxial, broadband	CSMA/CD	30 miles in radius	250	Yes	500K bit/sec.	NA	16 bits	$695

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- Menu—The International Software Database — *International Software Listings*
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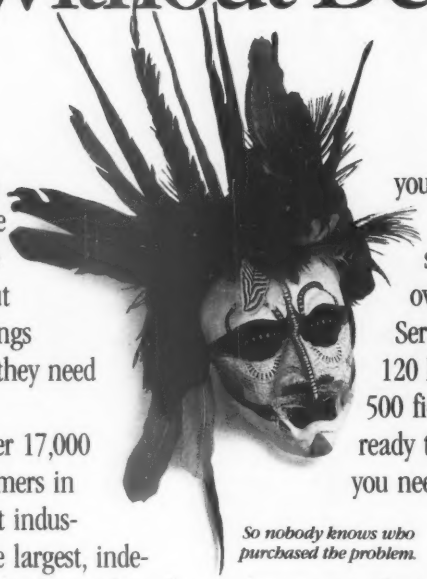

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HARD TALK

James Connolly

IBM's quiet firecracker

When they enhanced their 4381 processors last month, IBM officials told analysts the announcements were comparable to Mark Twain's assertion that rumors of his death were greatly exaggerated.

Not only are the 4381s alive, they seem to keep chugging along, drawing little attention but probably cranking up nice revenue numbers for IBM, even as the product family grows long in tooth. In some ways, the 4381s are the forgotten members of IBM's family.

There are more than 4,900 4381s installed in the U.S., according to Computer Intelligence, a La Jolla, Calif., research firm. In addition, Computer Intelligence counted more than 4,500 installations using the 4381's predecessor, the 4341.

IBM doesn't report revenue for specific products. But if each of those 9,400-plus 4381 and 4341 customers spends $50,000 a year for memory upgrades, license fees, maintenance and peripherals, the high-end 4300s are a $470 mil-

Continued on page 65

Census Bureau counts on VAX

Continues move toward decentralization with $80M 600-unit purchase

BY DONNA RAIMONDI
CW STAFF

SUITLAND, Md. — The U.S. Bureau of the Census hopes to provide faster results from census data with the aid of Digital Equipment Corp. VAX minicomputers to be acquired under an $80 million contract signed recently.

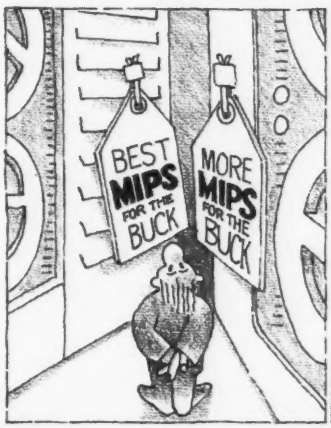
"We hope to realize a quality improvement and to provide the census data more promptly," said Bryant Benton, associate director for management services at the bureau. The contract with DEC is the second big step taken to decentralize the former mainframe facility. "In the past three or four years, we have acquired about 1,700 microcomputers, and now we will add more than 600 minis," he said.

The bureau decided to use micros and minis when it changed from a centralized mainframe philosophy to a decentralized shop. The bureau has been a mainframe shop since the birth of the mainframe. It installed the first commercially available computer in the world — the Univac One, Serial No. 1 — and has tapped Unisys Corp.'s line of predecessors — Sperry Corp., Sperry Rand Corp., Remington Rand, Inc. and Eckert-Mauchly Computer Corp. — for equipment since Eckert-Mauchly installed the Univac in 1951.

Continued on page 68

UPDATE

Do benchmarks measure up?



BY ALAN ALPER
CW STAFF

When it comes to judging a computer's performance, some MIS managers count on millions of instructions per second (MIPS) or floating-point operations per second. Others use Whetstones, Dhrystones or Livermore Loops, depending on the class of machine they want to rate.

Yet even dedicated benchmark enthusiasts concede that these generic measurements provide, at best, only optimal performance ratings. Most benchmarks, they point out, shed little light on how a computer will perform when running actual production work loads.

"All people do not use computers for the same things, so no one tool can classify

Continued on page 64

Disk drive leads DEC in storage

BY JAMES CONNOLLY
CW STAFF

MILPITAS, Calif. — Jumping ahead of Digital Equipment Corp. in the race to provide large storage capacities for high-end DEC VAX superminicomputers, System Industries, Inc. has announced a compact 1.1G-byte drive designed to be plug-compatible with DEC's Digital Storage Architecture (DSA).

System Industries also claimed the SI93 C-Series Disk Drive features a 15 msec average seek time. System Industries Chairman Robert Duncan pitted SI93 configurations against DEC's SA482 Storage Array and claimed to provide greater storage capacity and floor-space savings in comparison with the DEC product.

The four-drive DEC SA482 has a formatted capacity of 2.5G bytes; System Industries claims a formatted capacity of 844M bytes for each of up to eight drives that can be housed in a single highboy enclosure, pro-

Continued on page 62

Inside

- Tape reporting by banks gaining acceptance. Page 62.
- Esprit adds high-end ASCII terminal. Page 63.
- Impell slashes Editing Workstation price. Page 69.

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Magnetic tape attracts banking industry, IRS

BY STANLEY GIBSON
CW STAFF

DETROIT — A pilot program in which banks may speed the filing of currency transaction reports (CTR) to the Internal Revenue Service by using magnetic tape instead of paper is gaining momentum and could lead to the use of Electronic Document Interchange (EDI) for the same purpose.

"We're looking at ways of automating the huge amounts of paper we have been getting as a result of the Bank Secrecy Act," said Phyllis Goldsworthy, CTR magnetic filing coordinator for the IRS in Detroit. The Detroit data center has been the hub of activity for setting up the program.

The Bank Secrecy Act dictates that banks report all transactions of more than $10,000 to the IRS. Law enforcement agencies use CTR forms to track cash obtained by drug dealers and bookmakers, who launder their proceeds by depositing them in banks. Increased prosecution of banks failing to file the forms gained wide publicity two years ago when the Bank of Boston Corp. and other large institutions were fined for failing to file. Prior to that, transaction forms had been filed at a rate of 70,000 per month. The number is now up to 400,000 per month, according to Goldsworthy.

The purpose of magnetic tape filing is to help the IRS get out from under a growing mountain of paperwork.

First discussed a year ago, the pilot program took shape last fall [CW, Sept. 15, 1986] after eight banks under the sponsorship of the Bank Administration Institute ironed out guidelines for tape reporting with the IRS. Since then, banks and software houses have worked out programs that track and report currency transactions of more than $10,000. Test transaction reports have been run with the IRS's Detroit data center.

On April 8, the IRS held a teleconference in 41 cities to explain recent developments to banks. Currently, 108 banks are active in the program, according to Goldsworthy.

"We wished we could have jumped right over the magnetic tape phase and gone directly to electronic reporting," she said, adding that tape has the advantage that all types of systems can output on it. That is not the case with EDI, although EDI has the advantage of greater speed and ease of use, she said.

The EDI process will be aided because 85% of banks use IBM or plug-compatible machines. The IRS in Detroit uses a National Advanced Systems Corp. NAS 7000 mainframe.

A program may be developed in which all IBM and plug-compatible equipment could be used, with exceptions made for those users who do not have such equipment. As a fallback, banks that could not use EDI could use tape, Goldsworthy said.

Obstacles to use

An obstacle to EDI is that federal law requires a bank official to sign an affidavit attesting to the accuracy and completeness of the reports. In the current program, a signed piece of paper accompanies each reel of tape. Although a paper document could be sent separately, Goldsworthy said the IRS is looking into sending an electronic signature or equivalent proof.

Another obstacle to use of EDI is that the transmissions must be secured. Therefore, an effective type of encryption must be put in place before EDI use becomes a reality.

Goldsworthy said the IRS is exploring sending its acknowledgements of receipt of the forms to banks on compact disk/read-only memory. These will be secure and easier than tape to search, should a bank need to retrieve documentation of its reports.

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Disk drive

FROM PAGE 61

viding 6.7G bytes of storage.

The System Industries product is based on a 9-in. NEC Corp. drive and System Industries interfaces supporting data transfers at up to 2.46M byte/sec.

System Industries said the SI93 should not hurt sales of the company's 3-month-old SI83 drive configurations, which are 8-in. drives providing 4G bytes of storage in an eight-drive configuration at a lower cost than the DEC SA482. The company said the SI83 products are aimed at users who want less data controlled by a single actuator and that it designed the SI93 for MIS shops with multiple VAXs.

Typical prices for a two-drive SI93 system range from $48,000 to $55,200, based on configuration. A six-drive system ranges from $136,500 to $157,000.

Wang boosts low-end OIS processors

LOWELL, Mass. — Wang Laboratories, Inc. has replaced three of its low-end Office Information System (OIS) processors with enhanced versions featuring increased storage capacity and support for more software options.

The OIS 45, 55 and 65 replace the OIS 40, 50 and 60 in a product line that is used principally as dedicated text processors.

Wang officials said the new models support software such as Wang's WP Plus integrated text and graphics editor, Wang Office electronic mail, electronic reference work data bases and third-party data processing packages. They said the older models can be upgraded to the new versions.

The OIS 45 with one workstation and a 33.6M-byte disk drive costs $7,200. An OIS 55, designed to support up to four users, costs $7,000 with a 33.6M-byte disk drive. The OIS 65, which supports up to eight users and includes a 42M-byte disk drive, costs $9,500.

Motorola extends System 8000 line

CUPERTINO, Calif. — Extending the low end of its Unix-based data processing and vertical business systems product line, Motorola Computer Systems, Inc. has announced an entry-level model for its System 8000 supermicrocomputers.

The Model 100 is based on the Motorola, Inc. 68020 microprocessor, the VMEbus and AT&T's Unix System V, Release 3.

Motorola said the system is targeted at the end-user and value-added reseller (VAR) markets.

Dhrystone tests encouraging

"This compact unit is very competitively priced and, according to a recent Dhrystone performance evaluation, it has almost twice the raw processing power of comparably priced products from our competitors," said Jack Hendron, Motorola's director of marketing.

The system was designed to support up to eight users with six VME slots, 2M to 4M bytes of memory and up to 160M bytes of disk storage.

According to Motorola, the Model 100 supports the same languages, application development tools, data management and third-party software available on other System 8000 products.

"For end users or VARs who need full capability but who do not need large investments in hardware, the Model 100 is ideal," Hendron said.

"In remote office situations, the Model 100 interfaces perfectly with larger 8000 family members located at the headquarters or other corporate offices," he added.

The Model 100 is scheduled for delivery in July. Prices are said to start at about $11,000.

Esprit Opus 4 sports dual-port function

Terminal said to allow users to communicate via hot key with separate hosts

BY ALAN ALPER
CW STAFF

MELVILLE, N.Y. — Esprit Systems, Inc. has brought out a high-end ASCII terminal that features dual-port functionality and three different windowing capabilities.

The dual-port feature is said to let users communicate via a hot key to two separate hosts or to two ports on one host. The feature supports hosts running Unix, Pick Systems' Pick or Microsoft Corp.'s Xenix.

A split-screen feature, called Viewport Windows, is said to allow the user to simultaneously observe both sets of data. Each viewport window is a full 132-column display and provides up to two pages of screen memory.

"On other terminals with a dual-port feature, you can view two different sets of data at the same time, but you have to flip back and forth," noted John Sasso, Esprit's president. "We're providing a more elegant way to do it."

The new Opus 4 also supports personal computer-like pop-up windows, a feature that debuted on the Opus 220 earlier this year. Called Express Windows, the feature integrates messages, menus and/or Help screens into an application. Up to four pages of memory allow users to suspend an application while other data and forms are overlaid in screen windows.

The terminal also offers pull-down windows containing desktop accessories, such as a calculator with memory.

Opus 4 emulates popular ASCII displays, including Wyse Technology's Wyse 50 and Esprit's 4-year-old Model 6310, and lists for $569.

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Benchmarks

FROM PAGE 61

a machine for all users," notes Neal Nelson, president of Chicago systems house Neal Nelson & Associates and author of a suite of business benchmark tests for Unix systems.

Moreover, most benchmarks reflect the needs of academics or scientists and do not address the real-world requirements of commercial data processing, Nelson says. "The benchmarks are written to reflect [scientific and university] usage, which is calculation-intensive rather than disk-intensive," he explains.

Spreading the gospel

Vendors, however, are using benchmarks as a means of spreading the gospel on the virtues of their latest and greatest systems. Benchmarks are used — and to some extent abused — by vendors seeking to portray their computers as superior to the competition's and to gloss over their own machines' shortcomings.

"Manufacturers have always tried to make themselves look good by giving out benchmark results in which their machines perform well," says Jack Dongarra, a computer scientist at the Argonne National Laboratory in Argonne, Ill., and developer of the Linpack benchmark. "If the results look good, it's a selling point with a customer; if they don't look good, then the customer is not exposed to it."

In addition, experts warn that benchmark results comparing various systems with different computing architectures may be misleading. The proliferation of reduced instruction set computers (RISC) and multiprocessing architectures has rendered one benchmark, MIPS, almost meaningless, experts say.

"The definition of MIPS is not standard," Nelson explains. "At one time, virtually all computers had the same instruction set, all were single-processor systems and there was no RISC or intensive I/O.

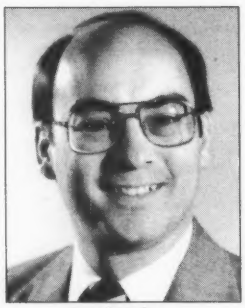
"Maybe in the early 1960s MIPS was a good way of judging how fast or slow a machine was, but things have changed," he adds.

MIPS wars raging

Yet the MIPS wars go on. IBM currently is doing battle with Digital Equipment Corp., pitting its 9370 family of mid-range processors against comparable DEC VAX computers.

While VAX MIPS ratings are generally higher than those of the comparable 9370s, IBM has gone on the offensive recently in a memo to customers, explaining that all MIPS are not created equal.

Because of its multiprocessor architecture, the 9370's capacity to handle a work load consisting of computational and non-computational functions is substantially greater than that of



Neal Nelson

a processor with only a single processing unit, IBM argues in a not-so-subtle allusion to DEC's VAX.

"An IBM 9370 is capable of simultaneously executing IBM 370 instructions in the instruction processing unit and I/O functions in the I/O processors," IBM's promotional literature says, continuing, "Some less advanced processors are limited to executing only one instruction at a time."

Such debates are vexing for users who are attempting to cut through the hype and find the right computer for a particular application.

DP professionals, however, claim that purchase decisions are rarely based solely on MIPS ratings. Many also seek the advice of DP colleagues whose companies are already using a piece of equipment running a similar application.

Only part of the picture

"MIPS is a very superficial way of looking at a box," notes Rainer Paul, vice-president of corporate management information services at Avon Products, Inc., a DEC VAX shop. "It doesn't tell you how many MIPS are consumed by the operating system."

Larry Stouder, information center manager of New York-based Continental Grain Co., adds, "I want to sit in front of a screen and see if a particular system is slow or fast. I'm not sure I care what the numbers are but whether the system has high availability or not."

Indeed, consultants usually tell their clients to refrain from assessing a machine based on its MIPS rating. They suggest that users find a way to evaluate how their applications would run on a particular piece of hardware.

"The only way to really compare machines is to run a work load on one and then on another," says Bob Djurdjevic, president of Annex Research, Inc., a Phoenix consultancy.

And some users have the capabilities to conduct such tests. Using their own benchmarks, they will bring a sample application — knowing its performance level on their existing systems — to a vendor's test facility and run it. Purchase decisions are, indeed, made using this type of proprietary benchmarking technique.

Claims vs. performance

Unfortunately, most users do not have the resources to carry out such a comparison. Djurdjevic suggests, in these cases, that users try to determine relative performance by comparing the vendors' claims with performance achieved by beta-test users.

"But this method doesn't fit every environment," he concedes. "It's a fundamental, middle-of-the-road rating."

Because of the general lack of standardized benchmarks for the commercial marketplace, a couple of firms have recently begun offering services to vendors and users alike.

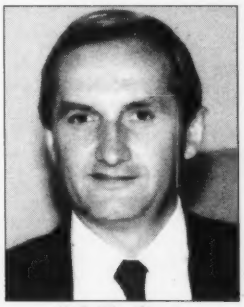
Nelson of Neal Nelson & Associates says he got into the benchmark business in 1983, after years as a third-party software developer for IBM and Unix-based systems. Nelson's interest in benchmarking started after he recommended to a client a multiuser system that ultimately performed far below expectations, despite a satisfactory MIPS rating.

Standard benchmarks, which provide broad measurements of a machine's performance — such as the speed of math functions and of the compiler — were unsuited to testing systems performance under true work conditions, Nelson learned.

So Nelson wrote his own benchmark, measuring 13 specific areas, including 16-bit math, 32-bit math, floating-point math, function-call speed, block reads and writes and random and repetitive reads. Nelson eventually expanded his benchmark to include 18 tests of different machine functions.

"I started the benchmarking for my own use; I didn't expect to get into the benchmark business," he recalls. The privately held software development firm now derives about half its annual revenue from benchmarking.

Nelson has benchmarked approximately 140 Unix systems to date and offers his results in report form to a variety of manufacturers and end users. Despite the potential for rifts with manufacturers, the benchmarking maven says he is not worried about making enemies in the bench-



Bob Djurdjevic

mark vendor community.

In fact, Nelson recently challenged the 8-MIPS rating NCR Corp. bestowed on its high-end Tower 32/800 [CW, May 11]. Nelson says an entry-level model of the multiprocessor system performed at one-half the speed of an entry-level Tower 32/600 on six recently conducted tests, some of which included disk-intensive tasks. On the tests assessing the machine's calculative abilities, however, the system was twice as fast as its predecessor.

Wants a retest

NCR responded by saying that Nelson's test is better suited to measure uniprocessors than multiple processors. Still, the computer maker has asked Nelson to retest the Tower 32/800 because tuning changes were made to the system after Nelson ran his benchmark.

Neal Nelson & Associates says its benchmark suite is aimed at multitasking and multiprocessor architecture systems and is not "single-threaded," as NCR claimed. Nelson does not seem overly concerned about the conflict.

What's in a name? Benchmarks defined

All benchmarks are not created equal. The following definitions should help you determine the benchmarks that are most applicable to your shop's needs.

Linpack — Developed by Jack Dongarra of the Argonne National Laboratory in Argonne, Ill., this benchmark compares the ability of different computers to solve dense systems of linear equations in a Fortran environment.

Livermore Loops — A set of 24 benchmark tests used primarily to assess the performance of supercomputers, this test measures a system's ability to process a series of Fortran kernels. The Livermore Loops have been under development by Frank McMahon since 1972 at the Lawrence Livermore National Laboratory in Livermore, Calif.

Whetstone — A synthetic benchmark used to characterize Fortran scalar computational performance, this test simulates high-level language patterns of use by weighing instruction types.

The benchmark was developed in the early 1970s at the National Physical Laboratory in the UK by H. J. Curnow and B. A. Wichman.

Dhrystone — Also a synthetic benchmark, it is written entirely in C and is based on statistical data about the actual usage of programming language features. It was developed by Reinhold P. Weicker and is becoming widely accepted for measuring Ada computational performance.

Aim Benchmarks — Written in C, this test measures Unix systems' performance on a variety of levels. Suite I tests nine areas, including disk performance, C compiler, multiuser sort and edit and CPU looping; Suite II evaluates seven application areas such as word processing, data base management, spreadsheet and accounting; Suite III measures 37 areas, including disk, floating-point and logic as well as eight application-specific tasks such as word processing, accounting and user-friendly interface.

Ansys — Developed by Swanson Analysis Systems, Inc. in Houston, Pa., this benchmark is a finite-element analysis program. It measures CPU, memory and I/O resources, enabling it to capture a system's performance in a wide array of computing environments.

Business Benchmark — Developed by Neal Nelson, president of Chicago systems house Neal Nelson & Associates, this multitasking benchmark suite measures a computer's performance under 18 different types of simulated work and over a range of up to 100 simultaneous tasks. It evaluates a computer's performance on both calculative- and disk-intensive tasks and can predict how a machine will perform with a given number of concurrent users.

These definitions were compiled from a variety of sources, including Jeffrey S. Wilson, a product manager at Multiflow Computer, Inc., a Branford, Conn., manufacturer of minisupercomputers.

ALAN ALPER

"If NCR criticizes the results of my benchmark on the Tower 32/800, it is criticizing the same test in which the Tower 32/600 was rated," he says.

Nelson says he foresees an even greater business opportunity as interest in Unix begins to swell, creating a need to differentiate between the wide variety of machines running various flavors of the same operating system, such as AT&T's Unix System V or the University of California at Berkeley's Unix 4.2. "We're seeing growing interest in benchmarking products," Nelson says. "We're trying to establish a niche for ourselves."

One of Nelson's competitors, Aim Technology, Inc., which has developed three different benchmark tests, is also witnessing increased awareness of the need for impartial testing. The 6-year-old firm's benchmarks simulate commercial end-user environments by measuring functions such as floating-point math, sorts, edits, random-access memory speed and computerized scheduling and looping. The firm has more than 350 clients, some of whom license its benchmarking software. Others subscribe to its reports.

"We've seen an increase in interest in benchmarking," notes Ellen Williams, Aim's vice-president of sales.

"People are not only interested in it for selection of equipment but [also] afterwards to assess the next release," Williams says.

Not everyone who is involved in benchmarking has done so for its profit potential. Argonne National Laboratory's Dongarra got into benchmarking equipment as a hobby.

"I don't do this for a living; I don't have the time. The people who fund me are not interested in it," Dongarra says, noting that Argonne is affiliated with the University of Chicago and funded by the Department of Energy.

Linpack an offshoot

As an offshoot of the laboratory's experimentation with emerging computer technology 10 years ago, Dongarra developed the Linpack, which, in the broadest sense, measures a computer's ability to perform floating-point arithmetic. "It's more suited to measure precisely a system's ability to solve a dense linear equation," he says.

Dongarra has tested hundreds of machines during the last couple of years, from low-end micros like Apple Computer, Inc.'s Apple II to Cray Research, Inc.'s high-end supercomputer, and he shares his results gratis with anyone who requests a copy of his report.

"I update it continuously. If I get information at 10 p.m., I'll go to my computer and update the table," Dongarra says.

Dongarra acknowledges that his benchmark is aimed only at scientific and technical users. He does not advise anyone to base their assessment of a machine on his results unless they know what they're looking for.

"A benchmark is only good if you know what you're measuring; if you don't, it's useless," he says.

IBM's firecracker

CONTINUED FROM PAGE 61

lion, Fortune 500-class business. That doesn't count what IBM collects for model upgrades or the $225,000 to $1.1 million price tag for new systems.

The 4300s are big business.

The question to be answered relates to why IBM allows the 4300s to have such a low profile. IBM's marketing emphasis is on its personal computer lines, the 9370 and System/36 mid-range systems and the 3090 mainframes.

IBM literature and IBM speakers seem to mention each of those product lines 10 times for every citation of the 4381. Once a year, the high-end 4300s get a performance kicker and a touch of praise, only to be forgotten until the next year.

Now, talk about the 4381s can shift again to the line's expected death at the hands of a 4391 or, as some predict, multiprocessor versions of the 9370.

The 4381 as a weapon

IBM should remember that a 4381-class machine can be a key weapon in the war with Digital Equipment Corp.

Much of the progress that DEC has made has been at the departmental level, where it pits its Microvax II and the low end of the VAX 8000 family against the System/36 and the 9370. But the next logical MIS battleground — where DEC would maintain it already is engaged — is the divisional or medium-size business market with hundreds of users, rather than the dozens of users at the departmental level.

Plenty of users want to avoid the headache of installing a complex, expensive, water-cooled 3090-type processor, although IBM did recently lower that entry-level cost. One sign of that is the number of users who resist IBM's efforts to drive them from IBM DOS/VSE to MVS.

It is obvious that IBM users want a 4381-class system, and it is clear that those users will need a significant price/performance gain when a successor machine is introduced next year or the year after. IBM reaffirmed its support for those users last month, but now the company must follow through on that commitment or risk losing some of its customer base to DEC's lure of price/performance and ease-of-use advantages.

Connolly is *Computerworld*'s senior editor, systems & peripherals.

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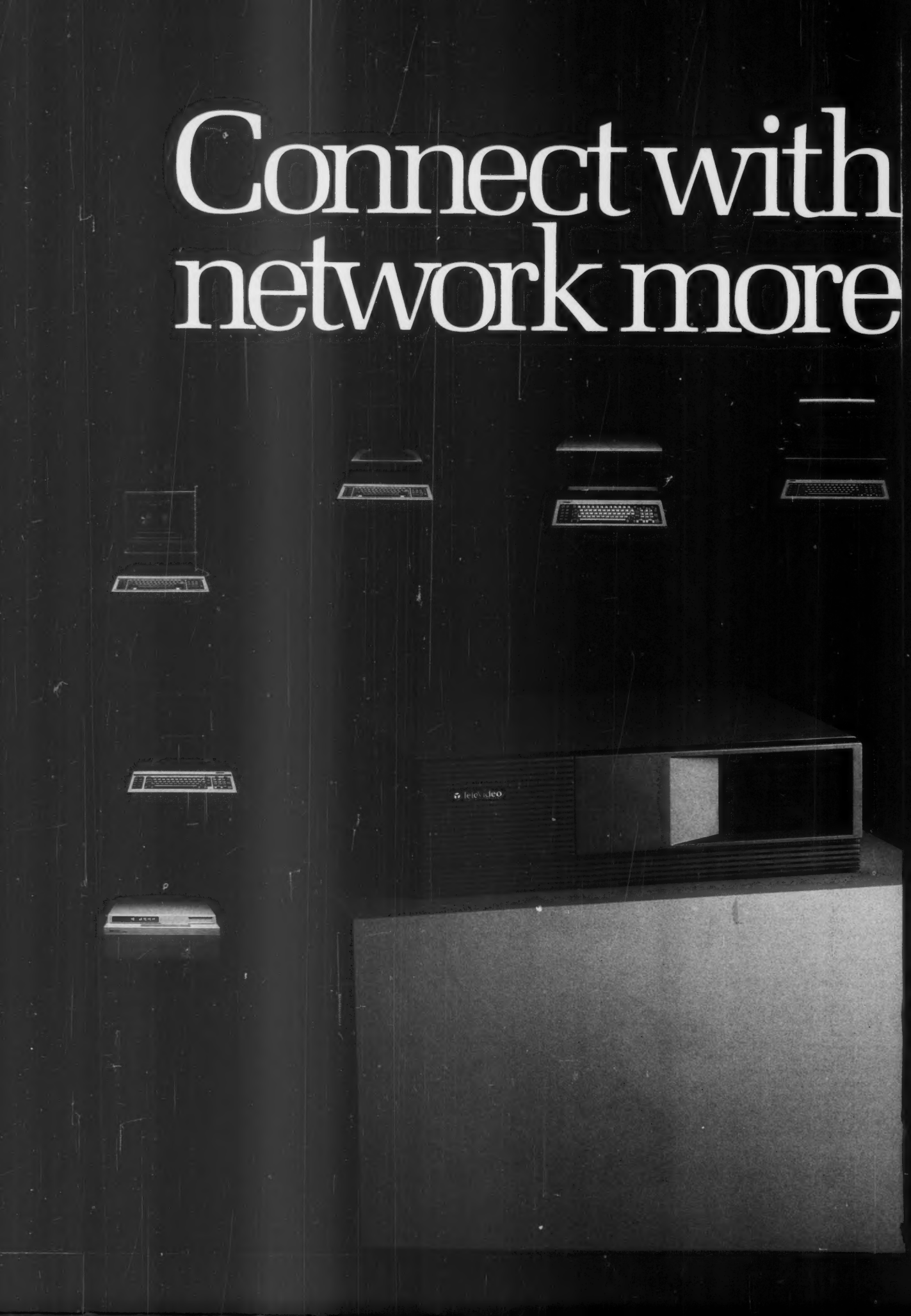

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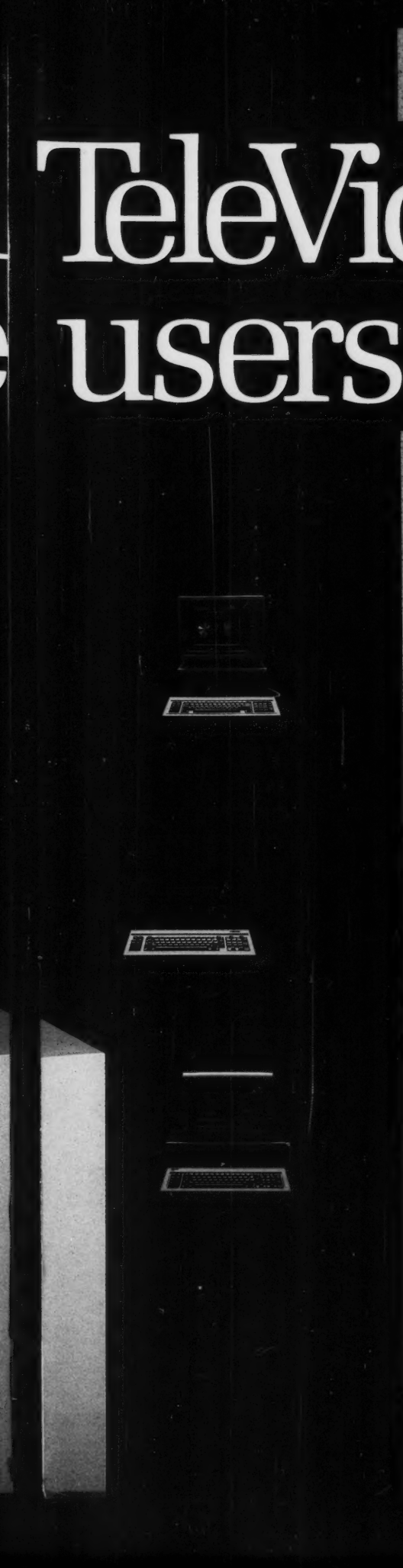

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Census

FROM PAGE 61

The DEC contract calls for a total of 600 VAXs — 450 of them Microvax II supermicrocomputers and the rest from the 8000 series of superminicomputers, as well as training, field service and software that includes data bases, languages and applications software.

"We have been in the mainframe business for a long time," Benton said. "The problem was that we were putting all of our eggs in one basket."

Processing methodologies were limited because the bureau had to do all processing at its Suitland, Md., site.

Was not user-friendly

Non-data processing census personnel such as economists and demographers had to work in conjunction with a data processing staff to manipulate their data because the mainframe system was not user-friendly, Benton explained.

The minicomputers will be put to new uses and will not replace the existing Unisys machines, Benton said. His shop currently runs a Unisys 1100/92, which is being upgraded to an 1100/94, two 1100/84s and an 1100/74. An IBM 4361 handles statistical processing.

The minis will be used for the 1990 decennial census, a geography (mapping) program in support of the 1990 and 1987 Agricultural and Economic Censuses that will be mailed out in December and will support the subject-matter analysts who interpret the census data.

Had to be compatible

One of the reasons the bureau chose DEC was that the VAX machines could communicate with each other and with the existing hardware. "The one requirement that we were not willing to budge on was that the machines had to be fully upwardly and downwardly compatible, and a lot of vendors fell out of the race when they could not meet that requirement," Benton said.

The bureau had to modify some of its commercial software, "but we think we have that compatibility issue solved," he added.

Training for the new systems will be intense. "We are talking in terms of 7,000 units of training, and the average unit of training is three days. That comes out to 21,000 staff days for the organization," Benton said.

Retraining the data processing staff for a new operating system will not be a problem because the bureau will use outside contract workers to the greatest extent possible, he said.

Modcomp adds to Classic 32s

FORT LAUDERDALE, Fla. — Modular Computer Systems, Inc. (Modcomp) recently added to its Classic 32 family of real-time systems with the introduction of the high-end Classic 32/87.

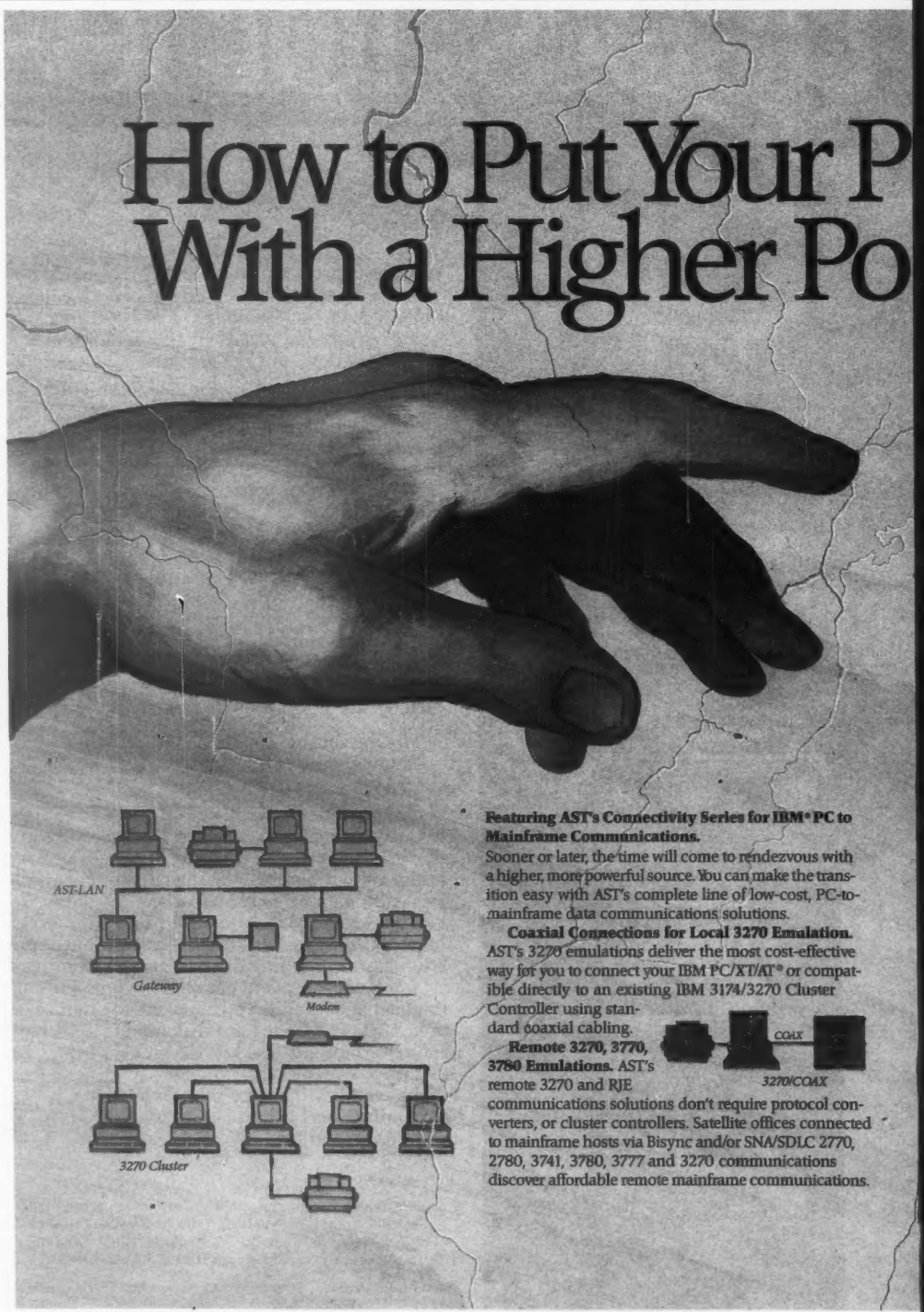
The system reportedly is compatible with Modcomp's earlier Classic 32/85 system as well as the company's MAX IV, MAX 32 and Realix operating systems.

It features redesigned CPUs and I/O controllers, which reportedly remove delays associated with memory mailboxes. Upgrades from the Classic 32/85 to the new system are available, Modcomp said.

The Classic 32/87 includes up to 256M bytes of solid-state memory, 64K bytes of cache memory, multilevel mapped-memory addressing and 16 sets of mapping registers. The maximum virtual program size is 1G byte.

The Classic 32/87 also features an eight-level instruction pipeline, an integral arithmetic unit and 8K words of writable control storage. Modcomp said the I/O transfer rate is 5M bit/sec.

The starting price is $148,500, which is equivalent to the Classic 32/85. The Classic 32/87 is scheduled to be available in July.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NEW PRODUCTS

Turnkey systems

Impell Computer Systems has reduced the price of its **Editing Workstation** to $9,995.

The Editing Workstation consists of a Sun Microsystems, Inc. 3/50 workstation and Impell's Re:Vision drawing editing software. The workstation features 4M bytes of memory, a 19-in. high-resolution monitor, Ethernet compatibility and Unix operating software. The Editing Workstation links to Impell's Drawing Processor host Sun Workstations, which provide mass storage and interfaces to a range of drawing scanners and plotters.

Impell, 2201 Dwight Way, Berkeley, Calif. 94704.

Processors

AST Research Inc.'s Camintonn/DEC Products Group has introduced the **CM-DRV11-WA**, an enhanced version of its direct-memory access controller module.

The card is said to support both Digital Equipment Corp.'s etch-level revision E modification and the etch-level revision D. It plugs directly into the computer's backplane and is compatible with all Q-bus computers and the Microvax II.

Other features include three data transfer rates, support for byte addressing and read/modify/write operations, switch-selectable device and vector addressing.

The CM-DRV11-WA costs $750.

AST, 2121 Alton Ave., Irvine, Calif. 92714.

A 32-bit VMEbus repeater system providing bidirectional VMEbus system expansion at 30M bytes/sec. has been announced by **HVE Engineering, Inc.**

The **HVE VMEbus Repeater 2000 series** is said to allow plug-and-play, transparent 32-bit address/data expansion of VMEbus-based systems, while incurring only 40 nsec of transfer overhead, without any alterations to software. Master or slave VMEbus cards in the primary or expansion system are supported automatically.

The repeater card also performs system-controller functions, including system clock source, bus arbitration and bus timer.

The HVE VMEbus Repeater 2000 system is priced at $1,995, including two 6-ft unshielded cables.

HVE Engineering, 1684 Dell Ave., Campbell, Calif. 95008.

Graphics systems

CGX Corp. has added the **2034** and **2035 graphics workstations** to its 2030 Color Raster Series of computer-aided design and manufacturing (CAD/CAM) products.

Both the two-dimensional Model 2034 and the three-dimensional Model 2035 are equipped with high-contrast, high-resolution color display monitors. Features include a real-time keyboard and optically encoded dials, Supercheck capability for identifying and accessing underlying elements in a drawing, the ability to upgrade the 2034 to the 2035 and support for IBM Model 2 Advanced Function instruction set.

Model 2034 and 2035 cost $15,950 and $19,950 respectively.

CGX, 43 Nagog Park, Acton, Mass. 01720.

Data storage

Distributed Logic Corp. has introduced the **DU686** en-

Continued on page 73

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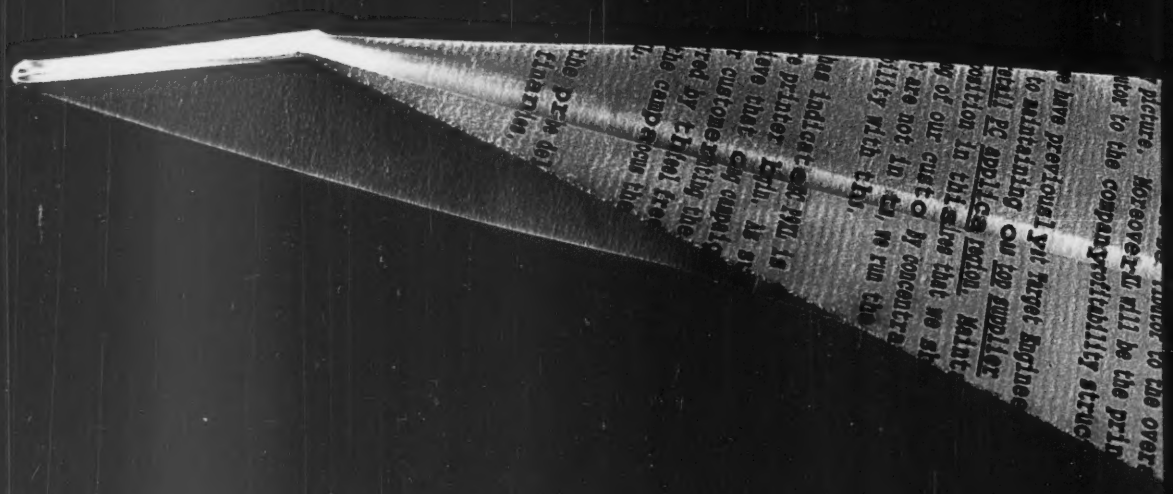

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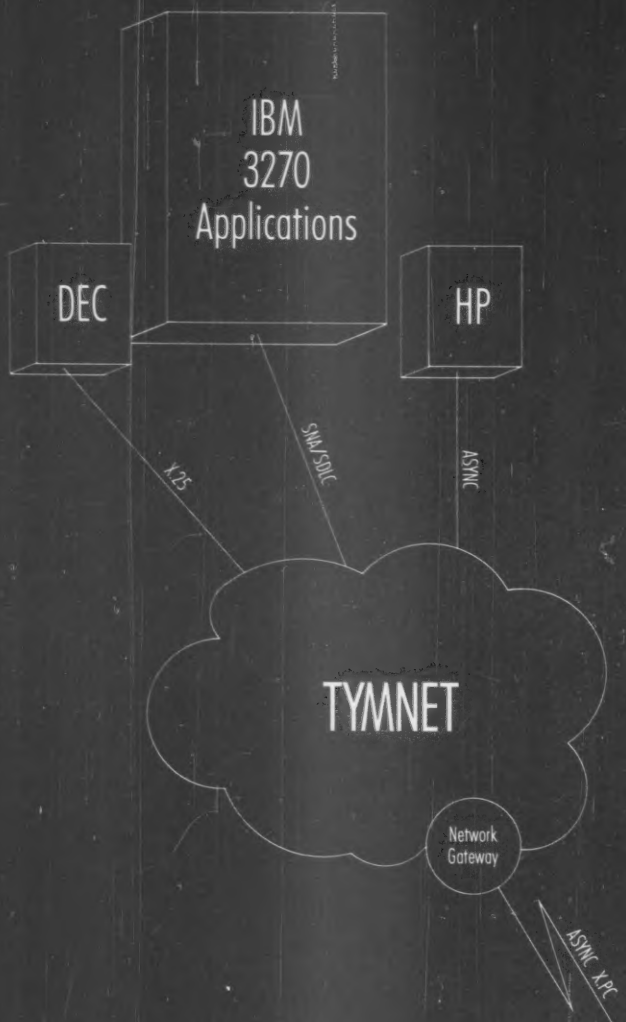

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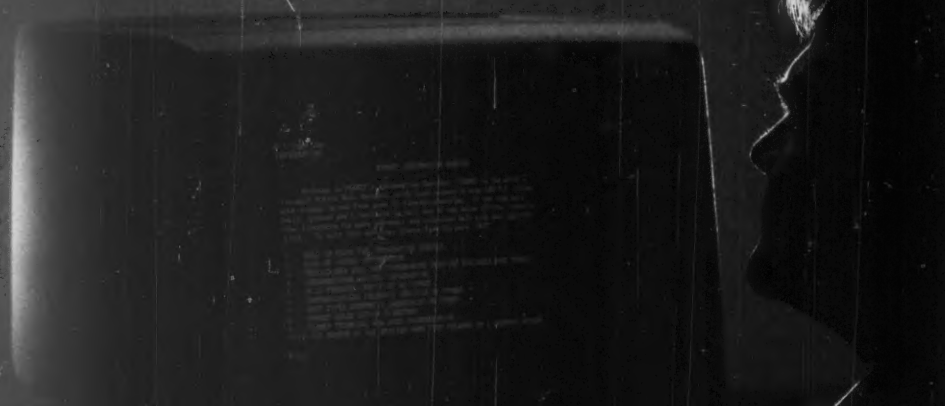

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MCDONNELL DOUGLAS

Continued from page 69

hanced small disk interface (ESDI) disk controller.

The quad-height controller is said to provide connection of up to four drives to Digital Equipment Corp. VAX and PDP-11 Unibus-based computers. It handles 5¼-in. Winchester disk drives with ESDI transfer rates up to 1.9M byte/sec. It is compatible with the Mass Storage Control Protocol.

Features include a command-queue buffer capable of storing up to 16 Seek commands from up to four drives and an elevator seek-ordering algorithm to determine the execution order for commands in the buffer.

The DU686 is priced at $2,150.

Distributed Logic, P.O. Box 6270, 1555 S. Sinclair St., Anaheim, Calif. 92806.

Maximum Strategy, Inc. has announced the **Strategy 1 File Access Controller.**

Strategy 1 is said to be capable of storing and retrieving data from four drives simultaneously.

The product features both enhanced small disk interface and storage module device disk interfaces and can provide subsystem storage capacities from 300M to 16G bytes as well as sustained data transfer rates from 3.5M to 10M byte/sec., according to the vendor.

Other features of the product reportedly include a 48-bit error-correction polynomial and burst data rates to 32M byte/sec. as well as a device-independent user interface.

The Strategy 1 File Access Controller is priced at $19,000.

Maximum Strategy, Suite 235, 160 E. Virginia St., San Jose, Calif. 95112.

Terminals

Liberty Electronics has announced the **Freedom One ANSI** terminal.

The Freedom One ANSI terminal is said to provide emulation of Digital Equipment Corp. VT220, VT100, VT52 and Data General Corp. Dasher D210 and D211 terminals. It comes with an amber 14-in. flat screen with full tilt-and-swivel. Keyboard options include VT220 and IBM Personal Computer.

The Freedom One ANSI terminal costs $499.

Liberty Electronics, 332 Harbor Way, South San Francisco, Calif. 94080.

Printers/Plotters

Facit, Inc. has added the **B3100** and the **B3150** printers to its family of general-purpose matrix printers.

The printers feature serial and Centronics Data Computer Corp. parallel interfaces and a nine-wire print head said to achieve speeds of 250 char./sec. in draft mode and 60 char./sec. in near-letter-quality mode. Both can emulate Facit and IBM Proprinter commands.

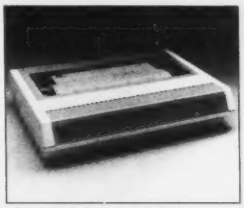
The B3100 is an 80-col. printer and the B3150 is a 136-col. printer. The B3100 costs $745. The B3150 costs $995. A color option can be added to the B3150 for $70. Color is standard on the B3100.

Facit, 9 Executive Drive, Merrimack, N.H. 03054.

The **Triprinter/4000** serial matrix printer, featuring a draft print speed of 400 char./sec. and enhanced paper-handling capabilities, has been introduced by **CIE Terminals, Inc.**, a subsidiary of C. Itoh Electronics, Inc.

Paper-handling options include single- and dual-bin sheet feeders for single-sheet applications and a slotted tear bar for fanfold paper. Push-pull tractor feed mechanisms accommodate up to six-part paper.

Other features include interchangeable personality cartridges; a front panel-selectable 87.5 char./sec. letter-quality mode; print options such as boldface and double-size characters; and emulations such as Digital Equipment Corp. LA-100/LA-210, IBM Graphics Printer and Epson America, Inc. FX series.



The *Triprinter/4000*

The Triprinter/4000 costs $$1,995.

CIE Terminals, 2505 McCabe Way, Irvine, Calif. 92714.

Auxiliary equipment

C&C/Concise Technology has announced its **CVMEBM1** VME bus monitor.

The unit plugs directly into the VME backplane, providing a direct diagnostic window onto the bus. It monitors all bus activity.

CVMEBM1 incorporates various pulse-stretching, latching and capture modes for system debugging and processes and displays each logical group of signals according to the group's particular function.

The status of 32-bit data and address lines is displayed on two banks of seven-segment displays.

The CVMEBM1 is priced at $3,000.

C&C/Concise, P.O. Box 280, 708 Mandrake Drive, Batavia, Ill. 60510.

Input devices

Intermec Corp. has announced the **Trakker** portable transaction manager.

The Trakker features an onboard program-development system, up to 512K bytes of random-access memory and direct support for a bar code laser scanner or conventional wand.

It has a 4-line by 20-char. LCD display and a 24-line display buffer and offers 48 keys and eight dedicated programmable function keys, according to the vendor. Audible feedback is provided through an adjustable volume speaker.

Trakker supports the Intermec 1500 solid-state moving-beam laser scanner and the 1260 series digital wands.

Trakker costs from $1,295.

Intermec, P.O. Box 360602, 4405 Russell Road, Lynnwood, Wash. 98046.

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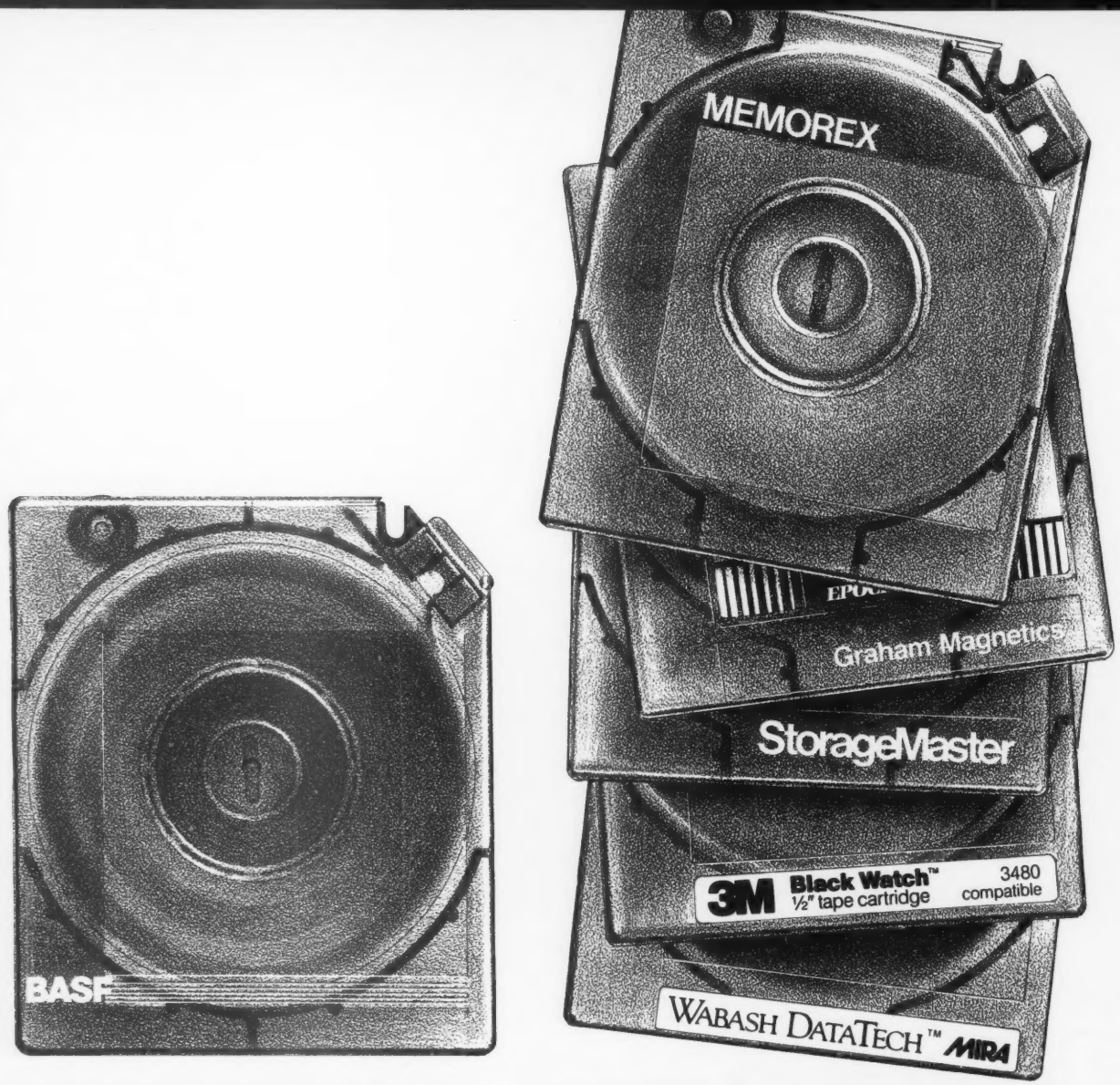

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Twelve rules for a distributed data base

A data base savant drafts the measures of true distribution

BY C. J. DATE

Distributed data base can be regarded as the most significant new development in the commercial data base world since the first genuine relational products finally reached the marketplace in the late '70s and early '80s. And just as the emergence of those relational products was accompanied by a considerable amount of confusion — some of which seemed to be deliberately fostered — as to exactly what the term "relational" meant, so it appears likely that a similar situation will develop with respect to the term "distributed." This article is an attempt to forestall such a situation.

Distributed data base research has been under way in universities, industrial research laboratories and similar establishments for many years. Now, at last, the fruits of that research are beginning to reach the marketplace. Several data base management system vendors have recently announced or promised distributed data base products, among them Relational Technology, Inc. with a distributed version of Ingres called Ingres Star, announced last June, and Oracle Corp. with a distributed version of Oracle called SQL Star, announced last September.

It is important to distinguish true generalized distributed data base systems from systems that merely provide remote data base access — sometimes called networking systems.

In a networking system, the user might be able to operate on data at a remote site or even on data at multiple remote sites simultaneously. But the seams show; the user is aware, to a greater or lesser extent, that the data is distributed and must behave accordingly. In a true distributed data base system, by contrast, the seams are hidden.

In the interest of brevity, no attempt to explain the details of distributed systems in any technical depth will be attempted here. However, it is worth mentioning that relational technology is what makes such systems feasible in the first place; in other words, for a distributed system to be successful, it must be relational. Older technologies are simply not adequate to perform the task.

PETER PERRY

It is convenient to begin with a couple of working definitions, although they are necessarily incomplete and somewhat imprecise at this point:

- A distributed data base system consists of a collection of sites, connected by means of a communications network, in which each site is a data base system site in its own right, but the sites have agreed to cooperate so that a user at any site can access any data in the network exactly as if the data were all stored at the user's own site.
- A distributed data base is a virtual data base, the components of which are physically stored in a number of distinct "real" data bases at a number of distinct sites.

Note that, as stated, each site is a data base system site in its own right. In other words, each site maintains its own local data bases, its own local users, its own local DBMS and transaction management software (including its own local locking, logging, recovery and terminal I/O components) and its own communications software. The distributed data base system can thus be regarded as a kind of partnership among the individual local DBMSs at the individual local sites.

Incidentally, it is customary to assume that the system is homogeneous, in the sense that each site is running a copy of the same DBMS — the strict homogeneity assumption. It is also usual to assume that the component sites are physically dispersed — and probably

Date is an independent author, lecturer and consultant specializing in relational data base technology. He is cofounder, with E. F. Codd, of The Relational Institute and the Codd and Date Consulting Group, both located in San Jose, Calif. This article is an abridged version of a longer and more technical paper that will appear in *InfoDB*, Vol. 2, Nos. 2 & 3, Summer/Fall 1987.

geographically dispersed also — although it is sufficient that they be dispersed logically. Two "sites" might even coexist on the same physical machine, especially during the initial system installation and testing period.

Look-alike systems

Now it is possible to state what I will call the fundamental principle of distributed data base: *To the user, a distributed system should look exactly like a nondistributed system.*

In other words, users — at least, data manipulation users — in a distributed system should be able to behave exactly as if the system were not distributed. The problems of distributed systems are internal implementation problems, not external end-user problems.

I will refer to the fundamental principle identified above as "Rule 0" for distributed systems. Rule 0 leads to a number of subsidiary rules — actually 12 of them. Please note that I make no claim that those subsidiary rules are each independent of the other, nor that they are all equally important, nor that they are discussed in any particular priority order. The only suggestion is that a system that genuinely supports all 12 of the rules might legitimately lay some claim to being a full-function distributed system.

Rule 1: Local autonomy. The sites in a distributed system should be autonomous. Autonomy means the following are true:

- Local data is locally owned and managed, with local accountability. All data belongs to some local data base, even if it is accessible from remote sites. Such matters as security, integrity and storage representation of the data remain under the control of the local site.
- Local operations remain purely local. Users performing operations involving only local data should not be penalized in any way by the fact that their site is participating in a distributed system. In particular, applications that ran successfully at a site before that site became part of the distributed system should continue to do so afterwards — even if some of the data is now moved to other sites.
- All operations at a given site are controlled by that site; no one site depends on some other site for its successful functioning. Otherwise, a site might be unavailable, even if there is nothing wrong with it per se, because some other site is down — obviously an undesirable state of affairs.

Actually, the autonomy objective is not wholly achievable; there are a few situations in which a given site must relinquish a certain degree of control to some other site. The autonomy objective would thus more accurately be stated as such: Sites should be autonomous to the maximum extent possible.

Rule 2: No reliance on a central site. Local autonomy implies that all sites must be treated as equals; there must not be any reliance on a central master site for some central service, such as centralized query processing or centralized transaction management.

This second objective is thus partly a corollary of the first. But "no reliance on a central site" is desirable in its own right, even if full local autonomy is not achieved. It is therefore worth spelling out as a separate objective.

Reliance on a central site would be undesirable for at least two reasons: First, the central site might be a bottleneck. Second, and more important, the system would be vulnerable — if the central site went down, the whole system would be down. In a distributed system, therefore, the following functions, among others, must all be distributed: dictionary management, query processing, concurrency control and recovery control.

Rule 3: Continuous operation. In a distributed system, just as in a nondistributed one, there should ideally never be any need for a planned system shutdown. Unfortunately, however, there are a few situations in which some kind of shutdown, and hence some disruption of service, seems unavoidable in a distributed environment.

The objective should thus be to keep such disruptions to a minimum. In particular, incorporating a new site into an existing distributed system should not

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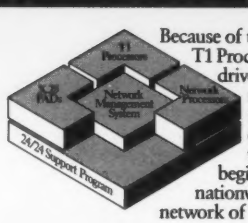

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require any changes to existing user programs or terminal activities at the site in question, nor should it disrupt service at any other site in the system. It should also be possible to upgrade the DBMS at any given site to a newer release without taking the entire system down.

Rule 4: Location independence. The basic idea of location independence is simple: Users should not have to know where data is physically stored but rather should be able to perform tasks — at least logically — as if the data were all stored at their own local site.

Location independence is desirable because it simplifies user programs and terminal activities. In particular, it allows data to migrate from site to site without invalidating any of those programs or activities. Such an ability to migrate is desirable because it allows data to be moved around the network in response to changing performance requirements.

Note that providing location independence for retrieval is easier than it is for update. For example, the first releases of Ingres Star and SQL Star both provided full location independence for retrieval but only limited location dependence, because neither allowed a single transaction to perform updates on more than one component of the real data base (see Rule 8). In the case of SQL Star, in fact, a transaction is not currently allowed to perform any updates at all except at the transaction's own site — that is, the site at which the entire transaction is executed.

Location independence requires a distributed data-naming scheme and corresponding support from the dictionary subsystem. The data-naming scheme must be such that users can refer to data by a local name exactly as if the data were at the user's own local site; from that local name, the dictionary subsystem must be able to locate the actual data. Therefore, the dictionary in a distributed system must necessarily differ in some respects from its nondistributed counterpart because, at the very least, it must now additionally specify the component site at which each data relation resides.

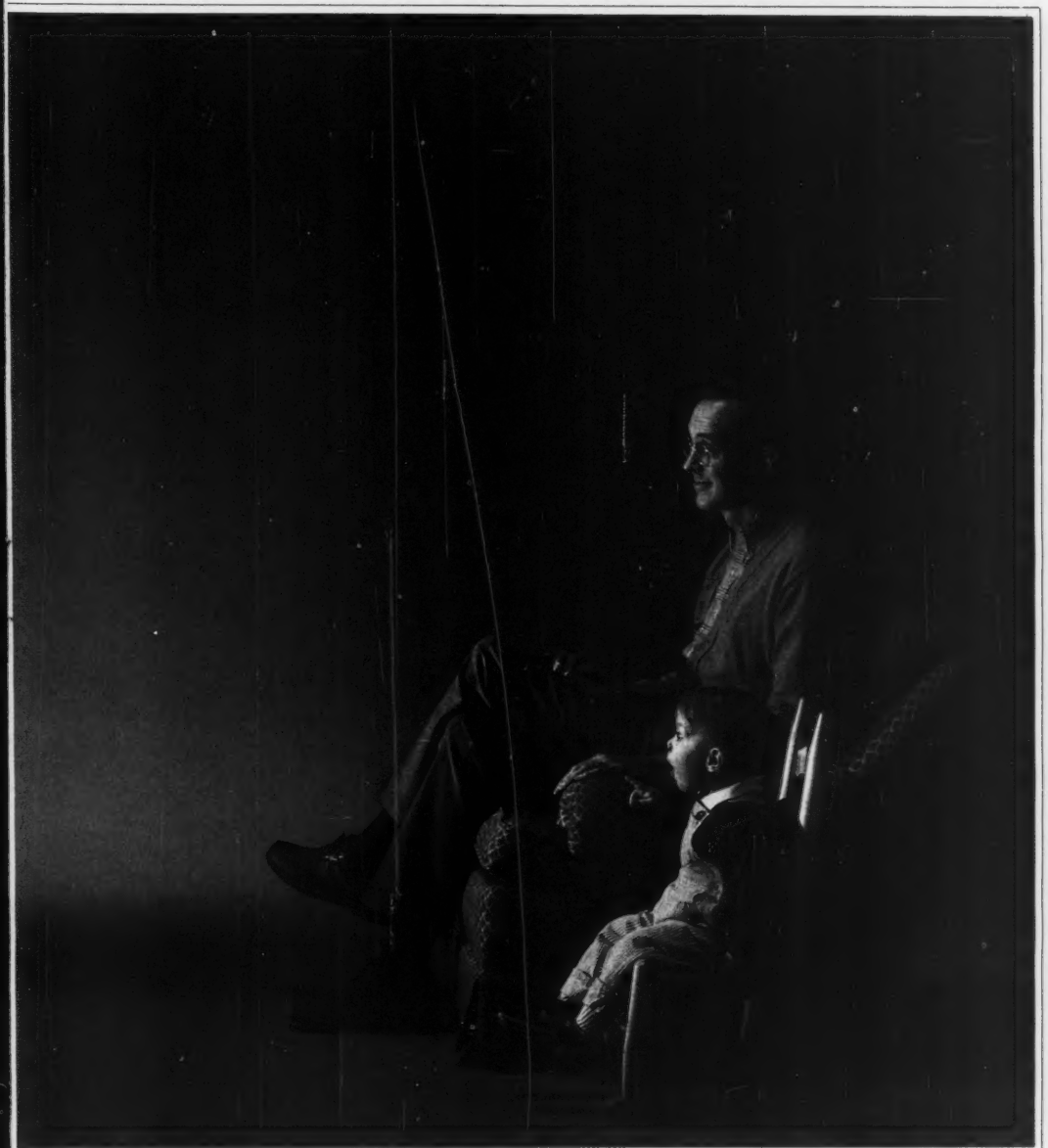
Rule 5: Fragmentation independence. A distributed system supports data fragmentation if a given relation can be divided up into pieces or "fragments" for physical storage purposes. Fragmentation is desirable for performance reasons: Data can be stored at the location where it is most frequently used so that most operations are purely local and network traffic is reduced. For example, the employee relation EMP might be fragmented such that records for New York employees are stored at the New York site, while records for London employees are stored at the London site.

EASE of fragmentation and reconstruction are two of the many reasons why distributed systems must be relational.

There are basically two kinds of fragmentation, horizontal and vertical, corresponding to the relational operations of restriction and projection, respectively. More generally, a fragment can be any arbitrary subrelation that can be derived from the original relation via restriction and projection operations. Reconstructing the original relation from the fragments is done via suitable Join and Union operations, Join for vertical fragments, Union for horizontal ones. Note that ease of fragmentation and reconstruction are two of the many reasons why distributed systems must be relational; the relational model provides exactly the operations needed for these tasks.

Now we come to the main point: A system that supports data fragmentation also supports fragmentation independence — that is, users should be able to behave, at least logically, as if the data were in fact not fragmented at all.

Fragmentation independence, like location independence, is desirable because it simplifies user programs and terminal activities. In particular, it allows data to be refragmented



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and fragments to be redistributed at any time in response to changing performance requirements without invalidating any of those user programs or activities.

Rule 6: Replication independence. A distributed system supports data replication if a given relation (more generally, a given fragment of a relation) can be represented at the physical level by many distinct stored copies or replicas at many distinct sites. Replication is desirable for at least two reasons:

- Performance. Applications can operate on local copies instead of having to communicate with remote sites.
- Availability. A given replicated object remains available for processing as long as at least one copy remains available.

The major disadvantage of replication is, of course, that when a given replicated object — say, a record within a replicated relation — is updated, all copies of that object must be updated (the update propagation problem).

PERFORMANCE is crucially dependent on the quality of the system optimizer. By contrast, performance in a nonrelational system is crucially dependent on the quality of the applications programmer.

Replication, like fragmentation, should be transparent to the user. In other words, a system that supports data replication should also support replication independence.

Replication independence, like location independence and fragmentation independence, is desirable because it simplifies user programs and terminal activities. In particular, replication independence allows replicas to be created and destroyed dynamically at any time in response to changing requirements, without invalidating any of those user programs or activities.

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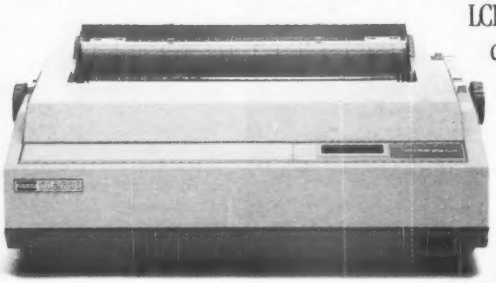

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Rule 7: Distributed query processing. Because queries in a relational system are expressed at a very high semantic level, there will normally be many possible strategies for their execution. Different strategies will, naturally, have different performance characteristics.

It is crucial to choose a good strategy. This is why the optimizer is such a critical component in relational systems: The optimizer is responsible for the choice of strategy. Performance in such a system is thus crucially dependent on the quality of the system optimizer.

By contrast, performance in a nonrelational system is crucially dependent on the quality of the applications programmer. And if the applications programmer chooses a bad strategy, there is no way the system can convert it into a good one — a major disadvantage of nonrelational systems.

All of the above applies with particular force to distributed systems, in which the difference in performance between a good strategy and a bad strategy might easily be many orders of magnitude. Query execution in a distributed system will itself be a distributed process; that is, it will involve both local CPU and I/O activity at several distinct sites (in general), together with some amount of data communication among those sites. This second component is a major performance factor — indeed, it is quite likely to dominate all of the rest, at least in a slow, long-haul network.

A major objective for the optimizer is, thus, to minimize this factor. Again, it is important that the optimizer do a good job. An illustration of this point can be found in my book, *An Introduction to Database Systems: Volume II* (Addison-Wesley Publishing Co., Reading, Mass., 1983), in which six different strategies for executing a given query are analyzed; the response time varies from a minimum of one second to a maximum of 2 1/3 days!

Therefore, it is important that optimization in a distributed system be performed from a global perspective. Furthermore, it is important that the optimization process itself be distributed; that is, it should involve both an overall optimization step (as just discussed) to minimize communications traffic, plus separate local optimization steps at each site.

For example, suppose Query Q is submitted at Site X, and Q involves, among other things, a join of Relation Ry of 100 records at Site Y with Relation Rz of a million records at Site Z. The optimizer at Site X will choose the overall strategy for executing Q; and it is clearly important that it decide to move Ry to Z and not Rz to Y (and certainly not Ry and Rz both to X).

Then, once it has decided to move Ry to Z, the strategy for performing the actual join at Site Z should be decided by the local optimizer at Z. It might be possible to use access paths at Z that were unknown to the optimizer at X at the time when that latter optimizer chose the overall strategy for Q.

Rule 8: Distributed transaction management. There are two major aspects of transaction management — recovery control and concurrency control — each of which requires extended treatment in the distributed environment.

Before getting into details, let me review a couple of basic concepts. First, a transaction is an atomic unit of work. "Atomic" means the transaction is an

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all-or-nothing proposition; specifically, if the transaction logic requires several updates to the data base, then either all of those updates are done or none of the updates are. It follows, then, that if a transaction performs some updates and then fails, for whatever reason, then those updates must be undone, or "rolled back."

If, on the other hand, the transaction reaches a successful conclusion, its updates must not be rolled back but must be made permanent, or "committed." Rolling back uncommitted updates constitutes recovery of a previous, and presumably correct, state of the data base; hence the term "recovery control."

In a distributed system, a single transaction can involve the execution of code at multiple sites and thus involve updates at multiple sites. To ensure that a given transaction remains atomic in the distributed environment, therefore, the system must ensure that the set of sites involved either all commit in unison or all roll back in unison. This effect can be achieved by means of a protocol called two-phase commit, or some variant thereof.

IT IS desirable to be able to run the same DBMS on different hardware systems and for those systems to participate as equal partners in a distributed system.

This is not the place to describe the two-phase commit protocol in detail. Suffice it to say that, for a given transaction, one of the sites (typically where the transaction was initially submitted) must serve as the coordinator in that protocol, and the other sites must serve as participants. Since different transactions will be submitted at different sites, distributed transaction management requires that every site must be prepared to serve both as the coordinator for some transactions and, in general, as a participant for other transactions. Certainly no central site should serve as the coordinator for all of the transactions, by virtue of Rule 2.

Turning now to concurrency control, this type of control in a distributed system almost certainly will be based on locking, just as it is in nondistributed systems. Other approaches to concurrency control have been investigated in the research world, but in practice, locking still seems to be the technique of choice.

Local autonomy says that each site must be responsible for lock management of its own local data; that is, each site will include its own lock manager. As a result, global deadlock is possible. A global deadlock is one in which two or more sites are in a simultaneous wait state, each one waiting for one of the others to release a lock before it can proceed.

The problem with global deadlock is that no site can detect it using only information that is internal to that site. In order to detect such a deadlock, therefore, sites must send some of their own internal information to other sites. Furthermore, there should not be any central "deadlock detector" site to which all sites send such information (Rule 2 again). Rather, the system should provide some kind of distributed deadlock detection mechanism. Alternatively, given that global deadlock detection is liable to be expensive (because of the additional message traffic it entails), it may be preferable to use some kind of time-out mechanism to prevent deadlocks from occurring in the first place.

Rule 9: Hardware independence. There is actually not a great deal to be said on this topic beyond what the heading implies. Real-world computer installations typically involve many different machines — IBM machines, Digital Equipment Corp. machines, Hewlett Packard Co. machines, Unisys Corp. machines, personal computers of various kinds and so on. There is a real need to be able to integrate the data on all of those systems and present the user with a "single-system image." Thus, it is desirable to be able to run the same DBMS on different hardware systems and for those different systems to participate as equal partners in a distributed system.

Rule 10: Operating system independence. This objective is partly a corollary of the previous one. It is obviously desirable not only to be able to run the same DBMS on different hardware systems but also to be able to run it on different operating systems — even different operating systems on the same hardware — and have, for example, an MVS version, a Unix version and an IBM PC-DOS version all participating in the same distributed system.

From a commercial point of view, the most important operating system environments, and hence the ones that (at a minimum) the DBMS should support, are probably IBM's MVS/XA, VM/CMS, DEC's VAX/VMS, Unix in various flavors and PC-DOS.

Rule 11: Network independence. Once again, there is not very much to say. If the system is to be able to support multiple disparate sites — with disparate hardware and disparate operating systems — then being able to support a variety of disparate communication networks is also desirable.

Ideally, the system should support both local-area networks, such as Ethernet, and long-haul networks, such as telephone lines. It should also support a variety of different network architectures, such as IBM's Systems Network Architecture, DEC's Decnet, Transmission

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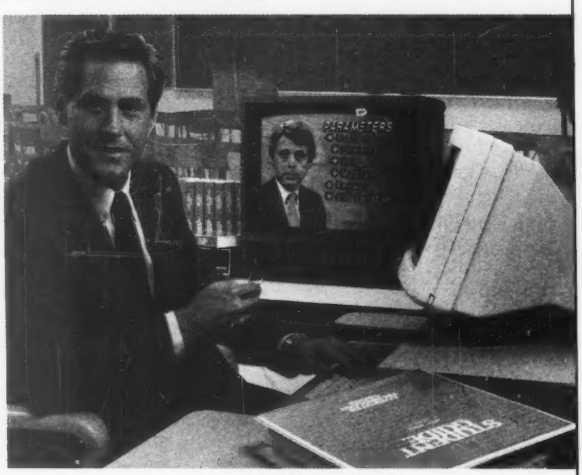

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Control Protocol/Internet Protocol and so on.

Rule 12: DBMS independence. Under this heading, I consider what is involved in relaxing the strict homogeneity assumption. That assumption is arguably a little too strong. All that is really needed is that the DBMSs at different sites all support the same interface; they do not necessarily all have to be copies of the same system.

For example, if Ingres and Oracle both supported the ANSI SQL standard, then it might be possible to get them both to talk to each other in the context of a distributed system. In other words, it might be possible for the distributed system to be heterogeneous, at least to some degree.

Support for heterogeneity would definitely be desirable. The fact is, again, that real-world computer installations typically run not only multiple different machines and multiple different operating systems, but these installations also often run different DBMSs as well. It would be nice if those different data base systems could all participate somehow in a distributed system. In other words, the ideal distributed system should provide DBMS independence.

To make the discussion a little more concrete, let us again consider the case of Ingres and Oracle. Both support SQL — or, at least, dialects thereof — which should simplify matters somewhat.

Suppose, therefore, that there are two sites running Ingres and Oracle, respectively, and a user at the Ingres site wishes to see a single distributed data base that includes data from the Ingres site and data from the Oracle site. By definition, that user is an Ingres user, and thus the distributed data base must be an Ingres data base so far as that specific user is concerned. Hence, the onus is on Ingres, and not Oracle, to provide the necessary additional support. What must that support consist of?

In principle, the support requirements are straightforward: Ingres must provide an application program, usually called a "gateway," that runs on Oracle and has the effect of making Oracle look like Ingres. That gateway must include all of the following capabilities, many of which present implementation problems of a very nontrivial nature:

- Implementing protocols for the exchange of information between Ingres and Oracle.
- Mapping the Oracle dictionary to the Ingres format.
- Accepting Ingres SQL requests, converting them to Oracle SQL, executing them, converting the results (including Oracle return codes and other feedback information) to Ingres form and returning them to Ingres.
- Serving as a participant in the Ingres variant of the two-phase commit protocol if Ingres transactions are to be allowed to perform updates at the Oracle site. (Note, however, that at this time, neither Ingres nor Oracle supports two-phase commit.)
- Ensuring that data at the Oracle site is in fact locked when Ingres needs it to be.

Protecting the investment

I have identified and described a set of 12 rules or objectives for a full-function distributed system. The rules all stem from Rule 0, which states: *To the user, a distributed system should look exactly like a nondistributed system.*

The 12 rules are as follows:

1. Local autonomy.
2. No reliance on a central site.
3. Continuous operation.
4. Location independence.
5. Fragmentation independence.
6. Replication independence.
7. Distributed query processing.
8. Distributed transaction management.
9. Hardware independence.
10. Operating system independence.
11. Network independence.
12. DBMS independence.

Note that the complete set of rules (or possibly some subset of them that includes at least Rules 4, 5, 6 and 8) taken together, seem to be equivalent to E. F. Codd's "distribution independence" rule for relational DBMSs [CW, Oct. 14, 1985]. Note, finally, that Rules 4 through 6 and 9 through 12 can all be regarded as extensions of the familiar notion of data independence, as that concept applies to the distributed environment. As such, they all translate into protection for the application investment. •

Inviting nonrelational sites

What about including a nonrelational site in an otherwise relational distributed system? Would it be possible to provide access to an IMS site from within Relational Technology, Inc.'s Ingres Star or Oracle Corp.'s SQL Star system? Such a feature would be very desirable in practice, given the enormous quantity of data that currently resides in nonrelational systems. But can it be done?

If the question means "Can it be done at the 100% level?" — meaning "Can all nonrelational data be made accessible from a relational interface, and can all relational operations be performed on that data?" — then the answer is definitely *no*. But if the question means "Can some useful level of functionality be provided?", then the answer might possibly be yes.

As an example, let us consider trying to incorporate an IMS site into an Ingres Star system. Some relevant considerations are as follows.

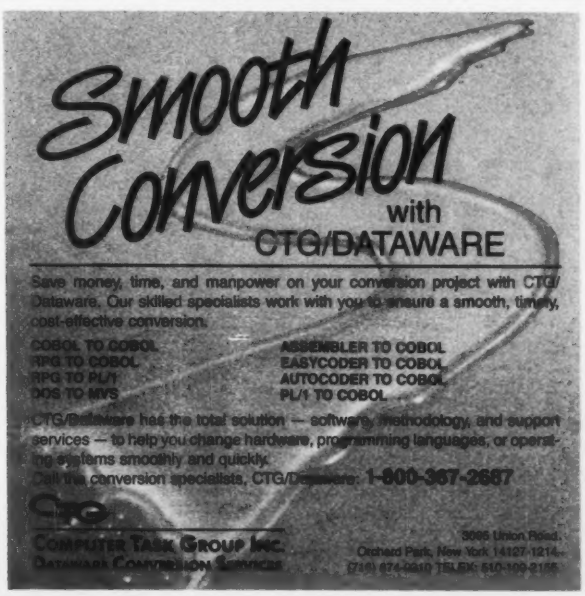
First, the more disciplined the IMS data base is — in particular, if the data base was designed in accordance with relational principles so every segment has a unique sequence field and there are no anonymous fields — the more feasible the proposition becomes. Note, however, that any such discipline merely makes the problem a little more tractable; it does not make it easy.

Second, it is unlikely that the process of mapping the IMS data base description to Ingres format will be automatic. IMS data bases are rarely sufficiently disciplined or "clean" for automatic mapping to be possible. Instead, a significant manual effort on the part of the IMS data base administrator will probably be necessary.

Third, a gateway must be provided at the IMS site. However, that gateway cannot really "make IMS look like Ingres." Building such a gateway would be tantamount to implementing an entire relational DBMS on top of IMS. Probably the gateway will merely provide some kind of "data extract" mechanism. For example, if it is necessary to perform a join involving data from the IMS site, the gateway will probably extract the records and ship them to the Ingres site, and the join itself will then be done at that site.

Finally, because of the data extract approach, access to the IMS site is likely to be read-only.

C. J. DATE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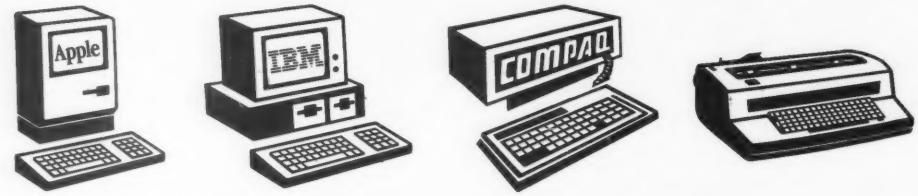

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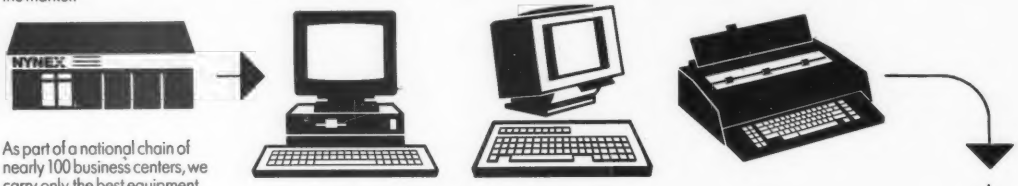

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MANAGEMENT

TAKING CHARGE

David Ludlum

Cures for NCC's ills

This year's National Computer Conference (NCC) gets under way in Chicago a week from today, and predictions about the fate of the long-running once-dominant computer trade show range from a mugging to a re-creation of the St. Valentine's Day massacre.

The number of vendors signed up to exhibit at McCormick Place has fallen from the 700 that displayed their wares at NCC a few years ago to fewer than 150, and many of this year's exhibitors are publishers and power supply vendors. With 3,000 people preregistered to attend the show, there will be a significant decline in attendance from 1983's peak of about 90,000.

The trade associations that sponsor NCC have suggested that among those taking in the show this year will be representatives of a professional conference management organization whom they will hire to run future exhibitions.

The move by the American Federation of Information Pro-

Continued on page 84

Prescription for a new service

Baxter Travenol offers its ordering system as EDI for health care field

BY DAVID A. LUDLUM
CW STAFF

MCGAW PARK, Ill. — The recently announced revamping of the on-line order-entry system developed by American Hospital Supply Corp. reflects changes in both technology and the health care industry and shows how the sharpest competitive edge gained from a strategic information system can erode as time goes by.

Baxter Travenol Laboratories, Inc., which acquired American and absorbed its highly regarded Asap order-entry system in 1985, has launched a joint effort with General Electric Information Services Co. (Geisco) to use Asap as part of an electronic document interchange (EDI) system for the health care industry [CW, May 18].

Although Baxter officials point to more positive motives, Robert Streight, Geisco's manager of health care EDI, says the move, in part, reflects a vulnerability in Baxter's system, specifically with its proprietary communications protocol, now that the health care industry has adopted the ANSI X12 standard.

The attraction of standardization is reinforced by aggressive cost cutting among hospitals, which prompts them to avoid using numerous, proprietary ordering systems, Streight adds. He notes that Baxter's rivals Johnson & Johnson and Abbot Laboratories have said that, like Baxter, they plan to open their order-entry systems to orders for other suppliers.

Growing business

Irvin Uskup, Baxter's vice-president of business technology, says that by opening Asap to orders for other suppliers, Baxter expects to increase the use of the system among both current users and new ones, which should boost Baxter's sales. Market research indicates Baxter's business grows faster among Asap users than among nonusers, Uskup says.

Geisco says it hopes to expand its EDI services. It turned to Baxter because Asap offered easier access to the more than 600,000 doctors, dentists, hospitals and other health care facilities that might use the services, according to Streight.

Under the name EDI Express, Geisco offers EDI to several other industries — the electronic exchange and protocol conversion for standardized trade documents. Its network can be accessed with a local telephone call from 650 cities in the U.S.

For the joint service, tentatively dubbed Asap Express, Baxter will function chiefly as a sales representative, collecting the orders via Asap and providing technical support to the purchasers, according to Geisco's

Continued on page 85

User's early input squelches system bugs

BY JEFFRY BEELER
CW STAFF

REDWOOD CITY, Calif. — Over the years, Richard Nicewonger and his colleagues at the San Mateo County, Calif., Assessor's Office have developed and installed innumerable information systems for internal use. But one in particular stands out in his mind.

What distinguishes their supplemental tax assessment system from the rest of the county's applications is its reliability. More than three years have passed since the office began implementing the system in four installments that lasted from April until October 1984. Yet during all that time, the associated software has never broken down nor otherwise revealed even one bug in its design or 45,000 lines of Cobol code, according to Nicewonger, chief of the office's administration and standards.

"I can't recall a single instance where our supplemental system has blown up or stopped our operations," he says. "We've received all our reports and turnaround documents on time and according to specifications."

For the assessor's office, such consistency is unprecedented. With every other development project it has undertaken in-house, the organization has always made at least one error that came to light only after the system went into production and later crashed unexpectedly.

The county's dismal track record reflects fundamental flaws in the ways it has traditionally approached systems debugging. In the past, the assessor's office often waited until a system had already been implemented before trying to find and remove many of its defects. "Basically, we tested systems a lot on our users," Nicewonger says.

But in developing the supplemental tax assessment system, his group shifted its emphasis from bug repair to bug prevention. In other words, the county concentrated its efforts on spotting and correcting program errors prior to implementation.

Toward that end, the assessor's office invited a representative of its user community to join the system's three-member development team to participate intimately in its labors from start to finish. At predetermined milestones along the way, the other two members of the group — both with technical backgrounds — were required to submit their results in writing to the user for his review and comments. If the submissions were deemed in compliance with all the team's previously agreed-upon requirements, the user signed his ini-

Continued on page 87

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NCC's ills

FROM PAGE 83

cessing Societies and its NCC cosponsors to hire professional exhibit managers to step in for their own unwieldly bureaucracy is one of the most encouraging signs imaginable for the show. Many of NCC's woes stem from an inability of the current management structure to react to changing times.

Ideas for turnaround

Here, therefore, are some thoughts and proposals for NCC's sponsors and their new exhibit managers in repositioning the conference.

NCC needs to address a raft of upheavals in the world of corporate information management that began quietly but are now like writing on the screen.

Prompted by more flexible technology and sophisticated management, computer power is increasingly being used for front-line business functions and distributed to companies' operating units and individual employees.

Both trends have led to a greater tailoring of systems to functions that are specific to a particular industry, which means users are apt to have increasingly narrow interests that are better addressed by targeted conferences than, in the words of one observer, the "fire hose" of products and information that NCC became.

But some who attended NCC over the years still value a broad-based show, and that is NCC's tradition. It's unlikely that NCC can displace the more successful targeted computer shows that have stolen much of its thunder, and there is no reason that it should. But NCC's sponsors might better focus the conference to make it more valuable to various components of the broad-based audience they seek. Its sponsors have expressed some interest in doing so. Following are some additional suggestions.

Pay attention to software

One essential move is devoting more attention to *software*, the key to the solutions that users are looking for and an area that NCC traditionally has neglected. One only need compare the financial performance of hardware and software vendors for the last two years to see where users' priorities lie.

Establishing a *theme* for each year's conference would also help. Themes might include areas such as organization-wide networks, integrating systems, communication standards, a new generation of microcomputers or expert systems.

Furthermore, NCC could benefit by creating a series of *vertical industry tracks* for fields such as banking, retailing and financial services. This way, NCC could segment its market and address the segments individually, just as sophisticated corporate marketers aim different products at different target markets.

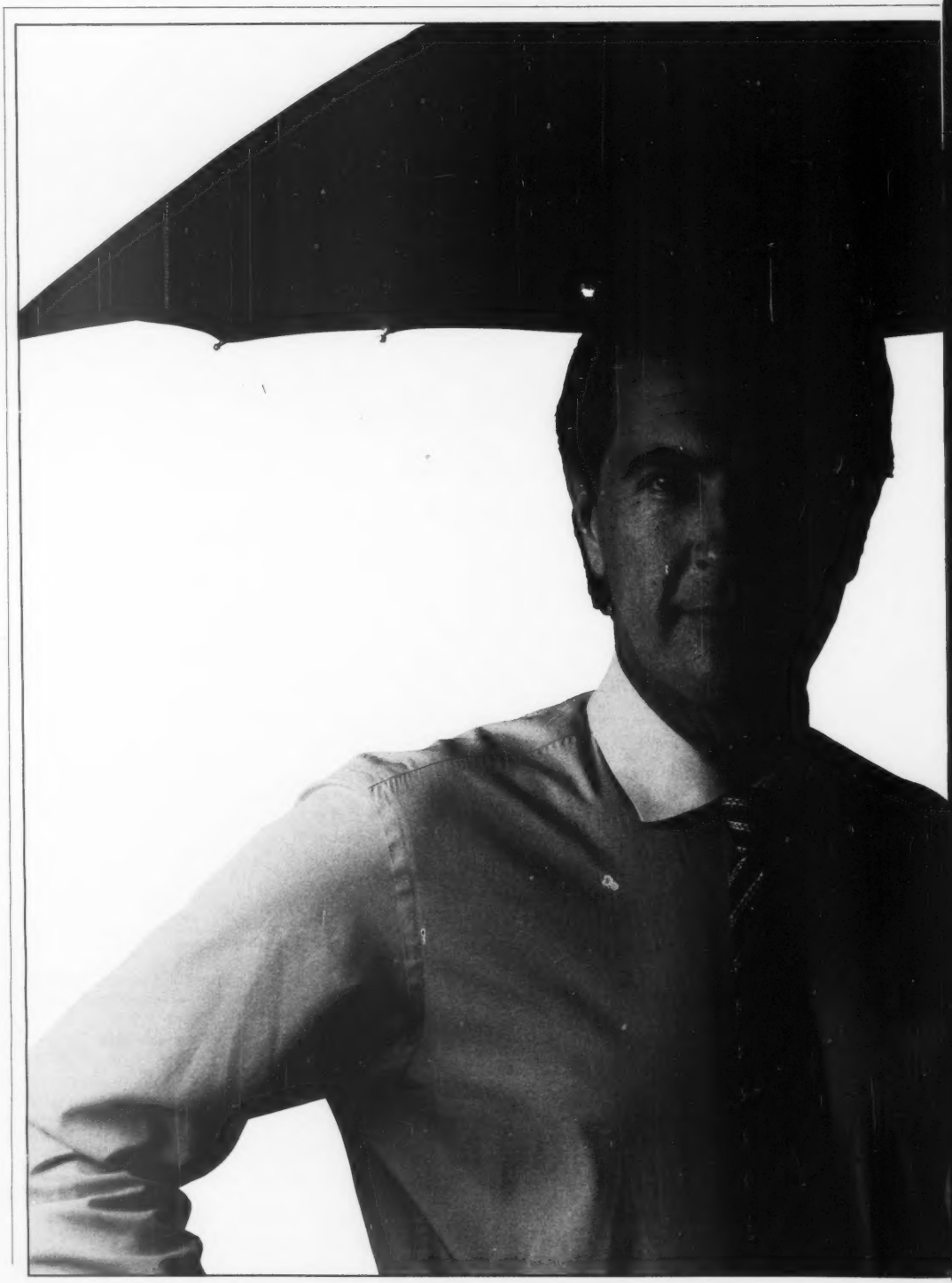
By focusing on business-oriented issues of the type likely to compose a track on a vertical industry, NCC also might do better at attracting the power buyers required for a heavy turnout by major vendors. Comdex, The Interface Group, Inc.'s microcomputer show that has stolen the largest part of NCC's thunder, has an advantage over NCC in that, while broad-based, it is also vertically oriented in catering to personal computer distributors.

Finally, NCC could make a deal with one or two smaller shows — on desktop publishing or software maintenance, for example — bringing them under its umbrella as *a core of specialized conferences* for a few hundred or a thousand people.

These specialized shows would draw individual audiences as well as some users interested in a mix of disciplines.

It appears that NCC's sponsors will gain from one move they already have made — holding future shows in the major local marketplaces of New York and the Los Angeles area rather than in Las Vegas. But they still have some high stakes gambling ahead of them in making emphatic moves to revive the conference.

Ludlum is *Computerworld's* senior editor, management.



Prescription

FROM PAGE 83

Streight.

Geisco and Baxter are developing front-end software for Asap that will separate orders destined for Baxter from those aimed elsewhere and route the latter to the appropriate supplier's EDI Express mailbox.

The companies are in the process of selecting a Big Eight accounting firm to audit the process and certify that Baxter does not have access to orders for other suppliers. "ANSI X12 communication offers total security. We leave the data encoded and pass it through the network vendor," says David Sennett, Baxter's director of customer systems.

The joint project came about after Geisco solicited Baxter to use EDI Express — which Baxter did — to send out some of its own purchase orders, according to Streight. The joint development effort was then pursued on the initiative of Michael S. Heschel, Baxter's vice-president for information services, and Baxter's sales and marketing organization, Uskup says. "We work very closely with the line functions," he adds.

Baxter and Geisco say they expect to test the multisupplier system with a few customers this summer and make it generally available this fall.

Baxter does not regard Asap, one of the best-known examples of a strategic use of information systems, as a direct generator of revenue. While airlines collect service fees from travel agents and other airlines for bookings made through their on-line reservation systems, Baxter does not charge buyers a fee for using Asap. "We don't turn around and actually charge for this particular service. It's not a profit-and-loss item," Usak adds.

Baxter hopes to provide additional services to its customers with the expanded system, such as cross-referencing product codes so a customer can order items from any supplier using its own identification numbers, Usuk says.

More user-friendly

In another thrust, Baxter is rewriting the software used to access Asap by personal computer in an effort to make it "much more user friendly," Sennett says. The new program will be available in September, he adds.

Purchasers access Asap through dumb terminals, including Touch-Tone telephones in a few cases, PCs or IBM RJE computer-to-computer links. The system runs on a collection of IBM 3090s, 3084s and 3081s and plug-compatible National Advanced Systems Corp. processors operating under MVS and CICS with IBM's IMS data base.

Asap handles orders accounting for roughly one-third of Baxter's $5.5 billion annual sales and is gradually being brought on-line with various departments in the company.

At about $1.9 billion, Baxter had about one-half the annual revenue of American when it bought American in 1985, although both companies had about 31,000 employees. Asap, on which American spent roughly $70 million during 10 years, was a major motive for the acquisition.

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CALENDAR

JUNE 14-20

Spectrum Conference on the Information and Telecommunications Systems Industry. Hyannis, Mass., June 14-16 — Contact: Jean A. Carbone, Decision Resources, Arthur D. Little, Inc., Acorn Park, Cambridge, Mass. 02140.

Harris Users' Exchange 1987 Symposium and Annual Meeting. Chicago, June 14-17 — Contact: Gary Chapman, Harris Users' Exchange, 2101 W. Cypress Creek Road, Fort Lauderdale, Fla. 33309.

1987 IFPS Users' Association National Meeting. Washington, D.C., June 14-18 — Contact: Merrill Medansky, Premark International, Room 452, 2211 Sanders Road, Northbrook, Ill. 60062.

Continued on page 86

Continued from page 85

1987 Government Management Information Sciences Conference. Minneapolis, June 14-18 — Contact: Stanley F. Gabriel, Management Information Services, Room A025, Mail Code 008, Government Center, Minneapolis, Minn. 55487.

Managing the Information Resource: Building Strategic Advantage. Lexington, Mass., June 14-19 — Contact: Annette Christensen, Suite 2381, Office of Executive Education, University of California at Los Angeles Graduate School of Management, Los Angeles, Calif. 90024.

EDP Auditors Association, Inc. 15th Annual Conference. Seattle, June 14-19 — Contact: EDPAA, P.O. Box 88180, Carol Stream, Ill. 60188.

Windows/Pagemaker Desktop Publishing Forum. New York, June 15-16 — Contact: Betsy Nagle, Hara & Associates, Suite 301, 2 Nickerson St., Seattle, Wash. 98109. Also being held June 23-24 in Los Angeles.

1987 Logic, Inc. Users' Conference. Irving, Texas, June 15-16 — Contact: Jonathan Bernstein or Susan Newberry, Grody/Tellem Communications, Inc., Suite 840, 11150 W. Olympic Blvd., Los Angeles, Calif. 90064.

Localnet East Exhibition and Conference. New York, June 15-17 — Contact: Carol Peters, Online International, Inc., 989 Avenue of the Americas, New York, N.Y. 10018.

1987 National Computer Conference. Chicago, June 15-18 — Contact: NCC '87, American Federation of Information Processing Societies, 1899 Preston White Drive, Reston, Va. 22091.

Network 90's. San Francisco, June 15-18 — Contact: U.S. Telecommunications Suppliers Association, Suite 600, 150 N. Michigan Ave., Chicago, Ill. 60601.

ISDN/87: The Third International Integrated Services Digital Network Exposition. Atlanta, June 15-19 — Contact: Christopher Kennelly, Information Gatekeepers, Inc., 214 Harvard Ave., Boston, Mass. 02134.

Comdex International in Europe. Nice, France, June 16-18 — Contact: The Interface Group, Inc., 300 First Ave., Needham, Mass. 02194.

Office Products Exchange Network, Inc. (IBM office systems users group) Conference. Stamford, Conn., June 16-18 — Contact: Coral Aiken, Stone and Webster Engineering Corp., 7th Floor, 245 Summer St., Boston, Mass. 02107.

Flat Panel Displays 1987 International Conference. Copenhagen, Denmark, June 17-18 — Contact: International Planning Information, Nordre Ringvej 201, 2600 Glostrup, Copenhagen, Denmark.

Justifying Automation: A Survival Strategy for the Coming Decade. Detroit, June 17-18 — Contact: Steve Trombino, Robotic Industries Association, 900 Victors Way, P.O. Box 3724, Ann Arbor, Mich. 48106.

Workshops on Computer-Assisted Map Analysis. Athens, Ga., June 17-18 — Contact: Joseph K. Berry, School of Forestry and Environmental Studies, Yale University, 205 Prospect St., New Haven, Conn. 06511. Also being held Sept. 16-17 in Corvallis, Ore., and Oct. 24-25 in Berkeley, Calif.

JUNE 21-27

The Payments Institute. Boulder, Colo., June 21-26 — Contact: Barbara Hill or Sandy Kennedy, National Automated Clearing House Association, Suite 640, 1901 L St. N.W., Washington, D.C. 20036.

Integrating Publishing Systems. Newton, Mass., June 23-24 — Contact: Bruce Schatzman, Xerox Systems Institute, Xerox Corp., 475 Oakmead Pkwy., Sunnyvale, Calif. 94086.

Continued on page 88

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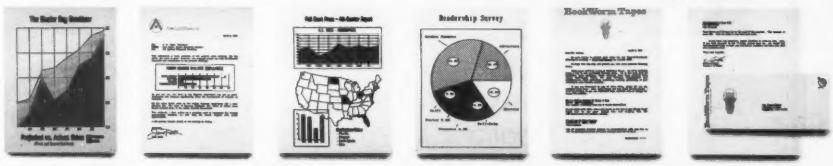

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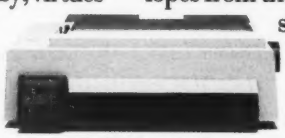

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User's input

FROM PAGE 83

tials as a mark of acceptance, Nicewonger says.

Although the assessor's office was experienced in using both the sign-off procedure and the team approach to program development, "we had never before adopted either to nearly the same extent," Nicewonger adds.

By keeping potentially serious mistakes from creeping undetected into the system's finished version and disrupting future production, the county has eliminated unnecessary delays in issuing its assessment notices, which are prerequisites for collecting property taxes.

The improved turnaround in producing its assessment notices, in turn, has enabled Nicewonger's organization to boost its rate of tax revenue collection by some $8 million per year.

Good investment

Of that sum, the county is entitled to keep 24% to 25%, or roughly $2 million, with the remainder going to the state. In contrast, the supplemental system cost only about $100,000 to build, Nicewonger says. "So it has provided a pretty good return on our investment."

Implemented in response to recent changes in state law, the county's system helps the assessor's office generate the key documents that are typically associated with official real estate appraisals.

Every time a piece of property changes owners or a construction project is completed, the assessor is required to estimate its value — an exercise that necessitates the assessment notice.

Creation of the notices is one of the jobs that has been assigned to the supplemental tax system, along with the production of various other reports.

Hired outside contractor

Because the county lacked the resources to develop the system entirely on its own, it enlisted the guidance of an outside contractor. From the Danville, Calif.-based DP consulting firm of Kapur & Associates, Inc., the assessor's office drew one of the members of its three-man development team. The other two were the county's staff programmer/analyst and the end user.

Together, the team members "locked themselves up in a conference room, where they spent many a day trying to get to the heart" of how to define and execute their proposed system's main mission, Nicewonger says.

Under persistent questioning by both the staff programmer and the independent consultant, the user was gradually able to consider all the system's possible alternatives and communicate his requirements to his two partners, according to Nicewonger.

Perspectives converged

In the end, the collaboration caused their differing perspectives to converge, with the two technicians increasing their empathy for the user's problems, and the user learning much about the process of systems development. "We made a kind of systems analyst out of him," Nicewonger says. "He even gained an understanding of how our files were going to be set up."

But the user's involvement in the project hardly ended after his requirements and specifications were defined and the prospective system was designed. "At every step along the way, he received both a verbal and written explanation of the status of the work to date," Nicewonger says.

"That way, the user could see exactly what the system would do even before it was written and could tell whether the logic that had been carried out in the program matched his needs," Nicewonger adds.

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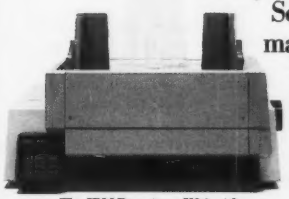
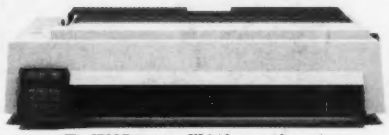


The IBM Proprinter X24 with optional sheet feed.



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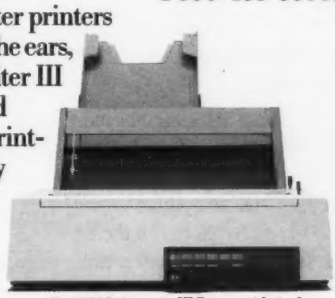
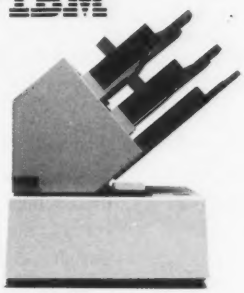


The IBM Quietwriter III Printer with single-drawer sheet feed.



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Software Tools 87. London, June 23-25 — Contact: Online International, Pinner Green House, Ash Hill Drive, Pinner, Middx HA5 2AE, UK.

A/E/C Systems '87 — The Eighth International Computer and Management Show for the Design and Construction Industry. Washington, D.C., June 23-26 — Contact: A/E/C Systems '87, P.O. Box 11318, Newington, Conn. 06111.

1987 National Educational Computing Conference. Philadelphia, June 24-26 — Contact: NECC '87, Department of Computer and Information Sciences, Box JAI, Computer Activities Bldg., Temple University, Philadelphia, Pa. 19122.

JUNE 28-JULY 4

4th Annual Microcomputer Managers Association Meeting & Show. New York, June 29-30 — Contact: Annie Zdinak, H. A. Bruno, Inc., 333 Sylvan Ave., Englewood Cliffs, N.J. 07632.

Syntopican XV. Dallas, June 29-July 2 — Contact: Association of Information Systems Professionals, 1015 N. York Road, Willow Grove, Pa. 19090.

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LOCAL HAPPENINGS

JUNE

American Marketing Association Boston Chapter/Computer Marketing Group's 3rd Annual Season-End Social. Wellesley, Mass. June 9, 6-9 p.m. — Contact: AMA Boston Chapter/Computer Marketing Group, P.O. Box 2570, Westwood, Mass. 02090.

Tax Forum — New Tax Laws. New York. June 10, 7:30-10 a.m. — Contact: Atlantic Division Chapter of the Association for Systems Management, c/o HBO, 1100 Avenue of the Americas, New York, N.Y. 10036.

Device-Independent Graphics Development in IBM Operating System/2. Boston. June 15 — Contact: Boston Computer Society Software Engineering Forum, 59 Morseland Ave., Newton, Mass. 02159.

Boston Area Statistical Analysis System Users Group. Bedford, Mass. June 18 — Contact: Alan Brooks, Mitre Corp., Rt. 62, Bedford, Mass. 01730.

Twenty-fifth Birthday of the Greater Boston Chapter of the ACM. Boston. June 20, 7 p.m. — Contact: Association for Computing Machinery, Greater Boston Chapter, P.O. Box 465, Lexington, Mass. 02173.

New England Users of VSE. Waltham, Mass. June 25, 1-4 p.m. — Contact: Terry Spaulding, *The New England Journal of Medicine*, 1440 Main St., Waltham, Mass. 02254.

Computer Security Seminar. Arlington, Va. June 26, 8:30 a.m. to 5:30 p.m. — Contact: Nova Chapter, Data Processing Management Association, P.O. Box 2163, Falls Church, Va. 22042.

JULY

Women's Progress as Leaders: Reality or Illusion? San Francisco. July 8, 5:30 p.m. — Contact: Beverly M. Matherne, Association for Women in Computing, Bay Area Chapter, Suite 1044, 41 Sutter St., San Francisco, Calif. 94104.

INDUSTRY INSIGHT

Clinton Wilder

Priced out of the ballpark

Will Computer Associates International, Inc.'s low-key chairman, Charles Wang, become known as the George Steinbrenner of the software industry?

Steinbrenner, the notorious owner of baseball's New York Yankees, built his championship teams of the 1970s by bidding unprecedented sums of money for free agents such as slugger Reggie Jackson.

Jackson turned out to be worth the investment, but subsequent high-priced players did not, and the "best team that money could buy" hasn't won the pennant in six years.

Higher stakes

What Steinbrenner's impressive pocketbook did, however, was raise the stakes for everyone in baseball's free-agent bidding wars.

Players with only mediocre talent, or those who had managed just one very good season, suddenly demanded salaries that could only be described as outrageous.

That same word was echoed by many in the computer industry last week, when Wang and his Garden City, N.Y., software colossus announced the proposed acquisition of Uccel Corp. for a staggering $800 million in Computer Associates stock.

Price an aftershock

If the impact on the systems software and banking applications markets was a major earthquake on the industry Richter scale, the price of the deal was a serious aftershock.

Compared with past acquisitions of pure software houses (as opposed to computer services firms), the price fetched by Uccel was almost four times that of the industry's previous largest deal — Ameritech Corp.'s $215 million buy-out of Applied Data Research, Inc. in 1985. And a look at statistical ratios is even more revealing.

In 24 computer industry "megadeals" in 1986 tracked by

Continued on page 90

Datapoint elects new CEO

Executive has high hopes for recovery of LAN-based systems vendor

BY ALAN J. RYAN
CW STAFF

SAN ANTONIO — Robert J. Potter, the newly elected chief executive officer of Datapoint Corp., expressed optimism last week about his new position and the struggling manufacturer of local-area network-based computer systems.

"I hope to bring a dimension of ability, strategic direction and improved profitability" to the company, he said.

Potter, 54, a 17-year veteran of the computer industry, has extensive business experience in the computing and telecommunications industries.

Most recently, he was group vice-president of Northern Telecom, Inc. and headed its Office Systems Group in Dallas for 2½ years.

Prior to that, Potter had been senior vice-president and chief technical officer with the former International Harvester Co., now called Navistar International Corp. His other work experience includes 13 years with Xerox Corp. and five years with IBM.

While Potter said he believes Datapoint will continue to show profits in upcoming quarters, he declined to discuss specific goals he has set for himself in his new post.

For the recent third quarter, Datapoint posted earnings of $4.4 million on sales of $78.7 million. But in its current fiscal year, the prior quarters have not been favorable.

For the second quarter, Datapoint suffered a staggering loss of $65.9 million on sales of $74.3 million. The loss included special charges of $56.8 million as the result of corporate realignment efforts. In the first quarter, a loss of $4.5 million was recorded on sales of $71.4 million.

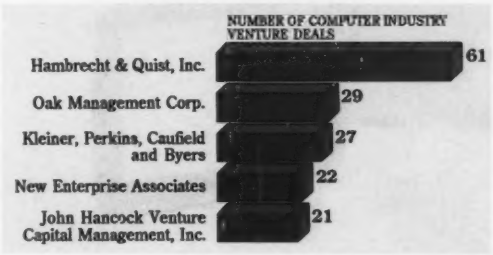
In January, then Datapoint President and CEO Edward P. Gistaro unexpectedly resigned. During the interim period, Doris D. Bencsik, executive vice-president and chief operating officer, held the acting CEO position.

Asher Edelman, Datapoint's chairman of the board, said last week, "We are extremely excited about the new team now in the office of the president, a team that includes Potter and Bencsik."

Data View

Top computer venture capital firms, 1986

Hambrecht & Quist continued its leadership with more than twice as many deals as its nearest competitor



INFORMATION PROVIDED BY TECHNOLOGIC PARTNERS
CW CHART: SUSAN ALDAM

Wyse plans acquisition

BY ALAN J. RYAN
CW STAFF

SAN JOSE, Calif. — Wyse Technology announced last week that it has reached an agreement in principle to acquire Link Technologies, Inc., a $260 million terminal maker based in Fremont, Calif. The deal would be sealed for an undisclosed amount of Wyse common stock, the companies said.

Continued on page 95

Floating Point thins its ranks

BY ALAN J. RYAN
CW STAFF

BEAVERTON, Ore. — Floating Point Systems, Inc. announced last week that it will trim 400 workers from its 1,200-employee worldwide work force and will consolidate eight operation departments into four.

The major restructuring, which includes a shift in the management structure, comes after Floating Point Chairman and Chief Executive Officer Milton R. Smith reportedly forecast that Floating Point would probably not experience a profitable year.

Last year, the firm lost $14.7 million on sales of $88.6 million. In the second quarter of fiscal 1987, the company lost $2.8 million on sales of $23.5 million.

The restructuring will bring with it an estimated one-time expense of $5 million to $10 million in the third quarter, which ends July 31, Floating Point spokes-

Continued on page 94

Inside

- Japanese heavyweights team up to develop 32-bit chip. Page 94.
- Apollo wins $100M Mentor workstation contract. Page 95.
- Venture capital firm founder Doriot dies. Page 95.

Cadam to loosen IBM apron strings

BY ROSEMARY HAMILTON
CW STAFF

BURBANK, Calif. — With the recent launch of a marketing scheme, Cadam, Inc., maker of large-systems computer-aided design and manufacturing (CAD/CAM) software, has taken its first step to lessen its dependency on IBM. Analysts said the move is critical for the company's future success.

For nearly a decade, Cadam's software has been marketed nonexclusively by IBM, using the IBM name. While Cadam executives said they expect this arrangement to continue for many years, the new marketing plans include a greater push by the software vendor's direct sales force.

Additionally, Cadam's product line — which includes more than a dozen products, from a basic drafting package to a three-dimensional capability — has been renamed Cimcore. The new name is intended to convey to customers that the vendor offers the essential, or core, component for computer-integrated manufacturing, or CIM, Cadam said.

"I have never thought it was wise for them to tie their star to IBM," said Vicki Brown, an analyst at International Data Corp. (IDC) in Framingham, Mass. "They've taken a step in the right direction, and it was one they had to take."

An IBM spokesman would not comment on Cadam's marketing plans other than to note that the two vendors have a "nonexclusive arrangement."

Since 1975, Cadam has sold its products directly, but the bulk of its revenue has come from the remarketing agreement established with IBM in 1978. As a subsidiary of Lockheed Corp., Cadam does not release revenue figures, but it clearly has reaped rewards from its IBM partnership.

IBM has steadily taken market share in the CAD/CAM industry and, in 1985, became the No. 1 supplier of CAD/CAM systems, a position it has maintained ever since, according to Daratech, Inc., a market research firm in Cambridge Mass.

Dataquest, Inc. in San Jose, Calif., said there have been an estimated 20,000 Cadam licenses issued worldwide — the majority through IBM — excluding the 3,000 Cadam systems used by internally at IBM.

Within the past few years, however, Cadam's benefactor has begun to cramp its style, according to Frank Puhl, Cadam's president. As Cadam expanded its product line from the basic drafting package, IBM added most of the new products to its own line. At the same time, IBM had been adding CAD/CAM software offerings from other vendors. The end result has been an IBM product line with competitive offerings that Cadam said it feels is stifling its growth.

"We are not satisfied that our products in all cases have been presented as effectively as they could have been," Cadam's Puhl said. "I'm sure we'll extend our relationship for many years, but

Continued on page 96

Priced

FROM PAGE 89

mergers and acquisitions research firm The Cerberus Group in Frenchtown, N.J., the median price paid by an acquirer was 2.36 times the acquiree's most recent annual revenue and 22.2 times its annual profits.

With Uccel's 1986 sales of $141 million and earnings of $17 million, Computer Associates will be paying 5.5 times revenue and 46 times earnings — more than double the industry premium. "That is astounding," says Cerberus President Charles Varga.

Varga says he fully expects the "Steinbrenner Effect" to occur in the minds of software company presidents, shareholders and venture capital investors across the nation.

If Uccel — a solid, well-managed company, but not exactly a Microsoft Corp. in terms of growth — is worth $780 million, what are other companies worth? Will everyone with a decent C compiler or CICS response-time analyzer suddenly sell out for millions and head for Easy Street?

A lot of people may think so, Varga says. "In the last eight years that we've been tracking the industry, we've found that the very large deals do affect the perception of other companies' relative worth," he says. "Everyone will think he can command the same ratios, whether his firm is really worth it or not. They will put asking prices on the table that will border on the absurd — and then there'll be a lot of negotiating as to why those firms are not worth it."

In the minds of Wang and the top brass of Computer Associates, however, Uccel clearly is a special case.

Wang obviously feels that the value of Uccel as an arm of Computer Associates far exceeds its value, judged objectively, as an independent entity.

If you can buy one single company to virtually corner the lucrative independent systems software market, that is worth megabucks.

The $780 million that Computer Associates is offering reflects the potential of that market much more than it represents a sober appraisal of Uccel's assets standing alone. And Uccel shareholders, especially mysterious Swiss investor Walter Haefner and his 58% ownership of the company, will now cash in on that potential.

Monopoly position

Computer Associates is in a unique position. By buying its largest competitor, it will essentially create a monopoly position, with all the attendant benefits of pricing, marketing, distribution and account control.

Yet the Computer Associates-Uccel match need never worry about the Department of Justice, because no one in a market that includes IBM can ever be called a monopoly with a straight face.

The game of buying your big competitor is hardly unique to the software industry. Last year, the long-distance telecom market saw the merger of United Telecommunications, Inc.'s U.S. Telecom Data Communications Co. and GTE Corp.'s Sprint into U.S. Sprint Communications Co.

Just two weeks ago, CIS Corp. launched a $50 million bid for CMI Corp. in a deal that would merge the No. 2 and No. 3 independent computer leasing firms.

Perceived value raised

Computer Associates and Wang may have raised the perceived value of every software company in one fell swoop. In reality, however, the future mergers that will compare with the Uccel deal will only be those unique situations where the acquirer can buy itself a very dominant market position.

The Steinbrenner Effect, which saw other baseball team owners spending themselves into the red by trying to match George's outrageous offers, will not occur in the software industry.

But it wouldn't surprise me if Charlie Wang is a Yankees fan.

Wilder is *Computerworld's* senior editor, computer industry.

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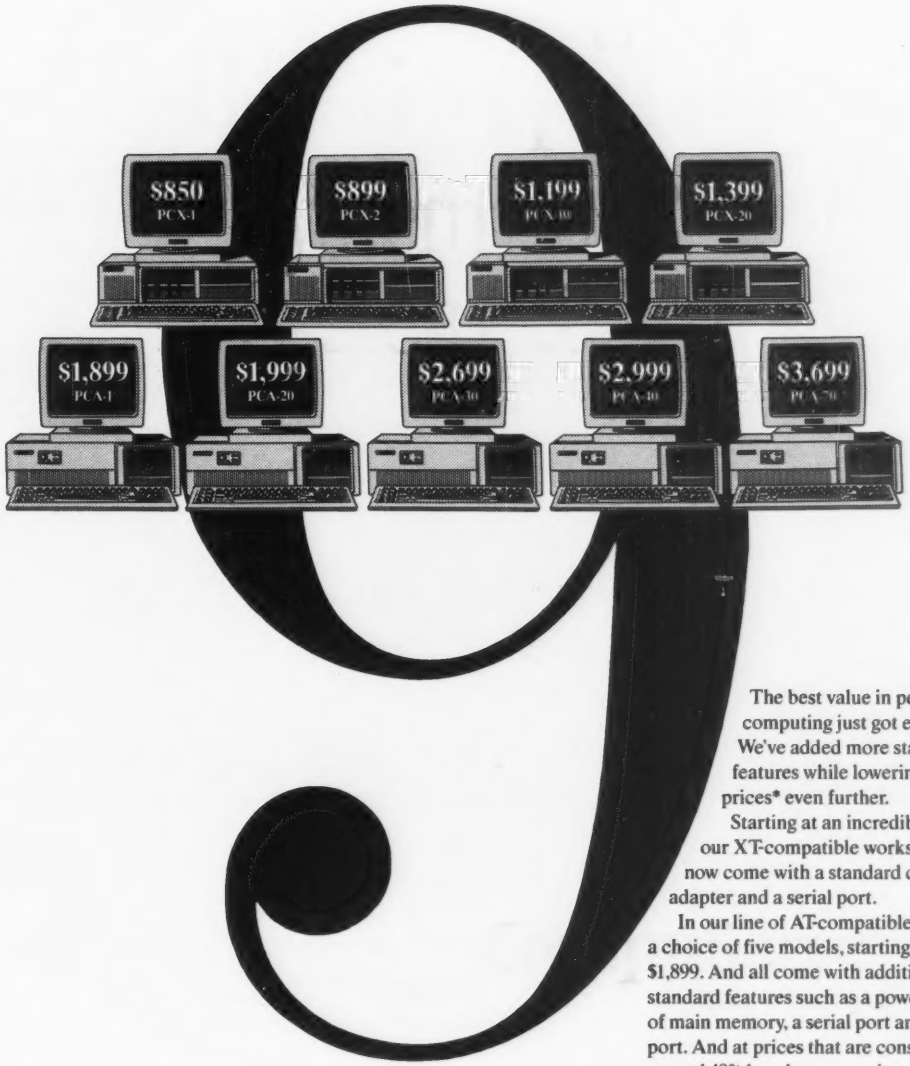

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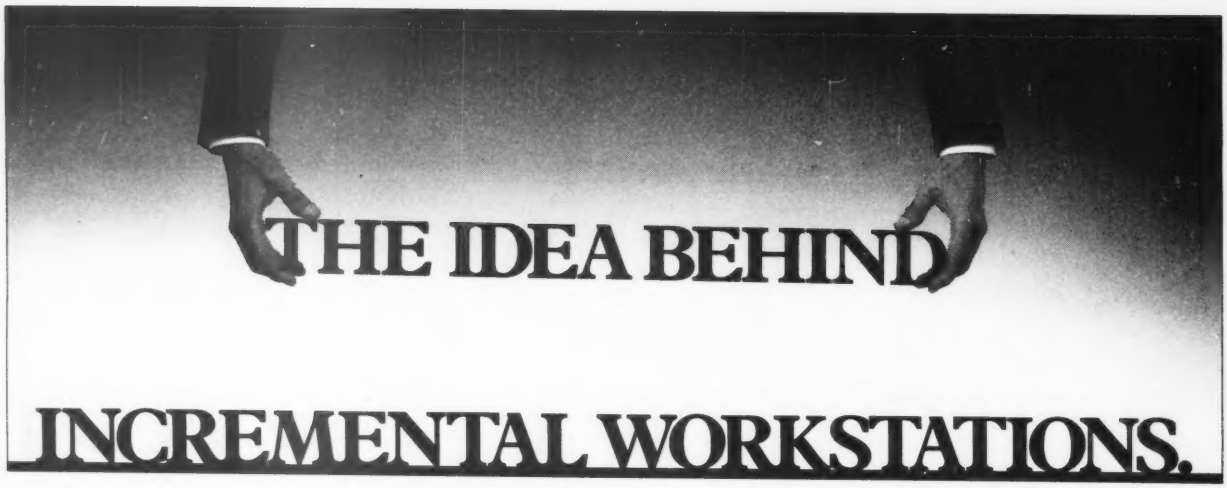

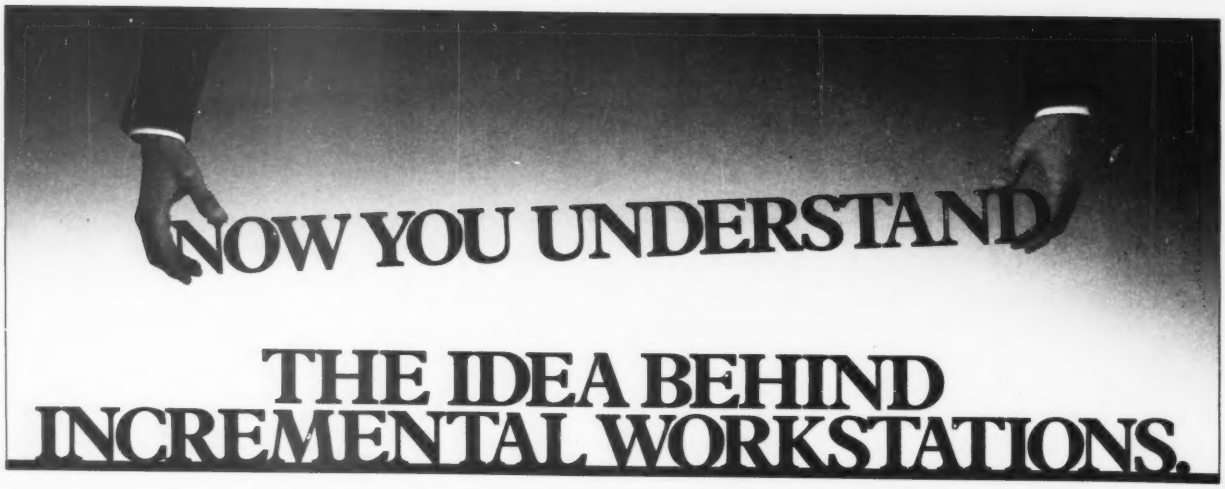

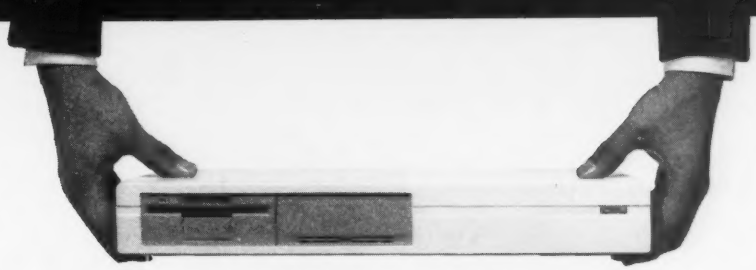

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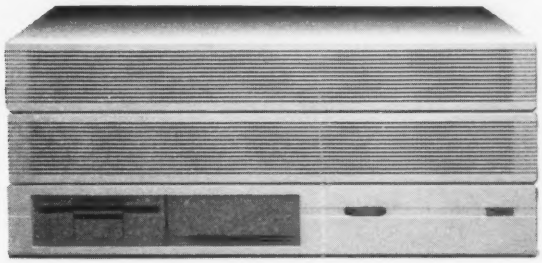

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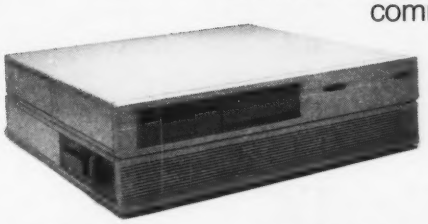

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Hitachi, Fujitsu, Mitsubishi meld R&D forces

Will work together to broaden 32-bit processor lines, develop related integrated circuits

BY YASUKO YOSHIMI
SPECIAL TO CW

TOKYO — Hitachi Ltd., Fujitsu Ltd. and Mitsubishi Electric Corp. have inked a pact under which the three will join forces to develop a family of 32-bit microprocessors based on The Realtime Operating System Nucleus (Tron) architecture.

The pact follows a similar agreement made between Hitachi and Fujitsu in October 1986 to build a standard microprocessor unit aimed at worldwide markets and specifically pitted against U.S. suppliers Intel Corp. and Motorola, Inc.

The three companies will work together to broaden their 32-bit processor product lines as well as to develop related large-scale integrated circuits.

Vendors pitch in

Tron, the first Japanese-designed operating system architecture, was developed by University of Tokyo scientist Ken Sakamura and has captured the attention of the Japanese computer industry. Some 40 Japanese technology vendors have joined the academic and industrial Tron project in an attempt to develop operating systems for business, factory and networked environments as well as for 32-bit processors.

In a joint statement, Hitachi, Fujitsu and Mitsubishi revealed an initial plan to build three 32-bit Tron processors targeted at vendors of office and engineering workstations and controllers.

The three new processors, to be called Gmicro/100, 200 and 300, will reportedly feature speeds ranging from 10 million instructions per second (MIPS) to 20 MIPS, surpassing the world's fastest processor speed to date, 7 MIPS, achieved by Motorola's 68030.

The companies said the processors will feature a clock cycle of 20 MHz and chip integration of between 300,000 and 900,000 transistors. Shipments are slated to begin at the end of this year.

In addition to this move, several leading Japanese manufacturers — Hitachi, Fujitsu, Toshiba Corp., Mitsubishi and Matsushita Electric Industrial Ltd. — are said to be planning introductions of their own 32-bit Tron-based processors by year's end. The processors are expected to feature speeds ranging from 5 to 10 MIPS.

Yoshimi is a Tokyo correspondent for the IDG News Service.

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Floating Point

CONTINUED FROM PAGE 89

woman Laura Barber said. However, the reorganization will save the company between $16 million and $20 million on an annual basis, she added.

Through the consolidation of operations, Floating Point's operations group will include manufacturing, continuation engineering and technical support; the sales and service group will encompass sales support and customer service; and product development will deal with new product development and related marketing activities. Finance and administration will make up the fourth department.

Making operations cost-efficient

"We are extremely saddened that the restructuring plan requires a work force reduction," Smith said. "However, our expectation that 1987 will be a slow turnaround year for Floating Point requires an intensified effort to make our operations even more cost-efficient."

The job reductions will be across the board, Barber said. "We have trimmed the organization from top to bottom."

According to analyst E. Lawrence Hickey of First Analysis Corp. in Chicago, Floating Point has been affected by "both the slow environment in the computer industry and competition from companies like Alliant Computer Systems Corp., Convex Computer Corp. and Multiflow Computer, Inc. — companies that are offering more million instructions per second per dollar."

Smith said expense reductions made in fiscal 1986 reduced the company's breakeven point. "We feel that the measures we are now taking will further contribute to a strengthened financial position. Despite a strong balance sheet, we feel we must move toward a position of sustained profitability," he said.

Last fall, Floating Point pared its costs by cutting salaries an average of 10%. As of June 1, those salaries have been reinstated. "The salary reinstatement in part underlines our response to a very challenging market in terms of aggressive operational product development, sales and marketing plans," Barber said.

In management restructuring, Floating Point President and Chief Operating Officer George P. O'Leary also will act as the head of the product development group; Roy T. Houston, previously the managing director of the Ireland manufacturing facility, has been appointed vice-president of the company's operations group.

Wyse plans

FROM PAGE 89

The acquisition would benefit Wyse by enabling it to increase its representation in the ASCII market, said Bill Seymour, vice-president of business development. Both Wyse and Link sell ASCII and ANSI terminals.

Wyse distributes its microprocessor-based video display products through distributors, resellers and OEMs. Link sells the computer terminals it develops through distributors and OEMs. But Seymour said that since the companies do not share many of the same distributors, "their distribution networks are quite complementary."

Link had recently been debating whether to go public or merge with another company, said Charles Lejsek, executive vice-president at Link. The company's goal was to become a top terminal supplier, but market leaders Wyse and Televideo Systems, Inc. were still far ahead. "To try to catch those guys would have been a disaster," he said.

Link reportedly will retain its own name, sales force and marketing strategy.

Senior writer David Bright contributed to this story.

DEC financier dies

Georges Doriot provided firm with first $70,000

BOSTON — Brig. Gen. Georges F. Doriot, whose venture capital firm gave Digital Equipment Corp. founder and President Ken Olsen the initial funding to start DEC 30 years ago, died last week of lung cancer at the age of 87.

Doriot, a member of the DEC board of directors throughout the company's history, founded the first public venture capital firm in the U.S., Boston-based American Research and Development Corp. American Research provided Olsen and DEC's two other cofounders with $70,000 to start DEC in 1957.

DEC is expected to record fiscal 1987 revenue of more than $9 billion and is the largest public company in the U.S. that is still run by its founder.

Doriot was a professor at Harvard University's Graduate School of Business Administration for 40 years before retiring in 1966. A native of France, Doriot served as a brigadier general in the U.S. Army in World War II.

Apollo wins $100M pact

CHELMSFORD, Mass. — Apollo Computer, Inc. announced last week its largest workstation contract ever, an 18-month, $100 million agreement with Beaverton, Ore.-based Mentor Graphics Corp.

Mentor, a major supplier of electronic-design automation systems, will purchase Apollo's Domain Series 3000 Personal Workstations and high-performance DN570 Turbo graphics workstations, Apollo said.

The workstations will serve as a hardware platform for Mentor's Idea series of workstations and are targeted at professionals performing advanced computer-aided design and engineering functions, Apollo claimed. The contract includes hardware for Context Corp., a Mentor company that bases its electronic technical publishing products on Apollo's Domain Series 3000.

MERGERS & ACQUISITIONS

Computer Associates International, Inc. announced it has acquired all of the assets of **L & L Software, Inc.**, a vendor of minicomputer-based integrated job-cost accounting systems for government contractors and selected commercial job-cost environments. L & L Software, based in McLean, Va., markets the Count Integrated Job Cost System, which provides government contractors with the ability to monitor project costs and ensure profitability while satisfying cost accounting standards imposed by government regulatory agencies.

Policy Management Systems Corp. recently acquired the majority of the assets and business of **Aavant Health Management Group, Inc.** in New Haven, Conn. Aavant is a start-up company providing software support for the functional activities of health maintenance organiztions and preferred provider organizations.

MAI Basic Four, Inc. has acquired its Denver dealer, **Computer Systems Marketing, Inc.**, and announced it has commenced marketing its business computer system solutions directly in Colorado.

Convergent, Inc. and **Baron Data Systems** in San Leandro, Calif., have announced that the shareholders of Baron Data have approved the terms of merger agreements pursuant to which Baron Data will become a wholly owned subsidiary of **Convergent Business Systems, Inc.** Based on the number of Baron Data shares outstanding, the total cash to be paid is approximately $33 million.

Convergent also announced the completion of its acquisition of **Oakleaf Corp.** for an undisclosed amount. Oakleaf is a Chatsworth, Calif.-based nationwide supplier of turnkey systems for auto dealerships and recorded sales of $26 million in 1986.

Dataserv, Inc. and **Software Funding International, Inc.** have signed an agreement in which Dataserv, a Bell South Corp. company, will acquire a portion of Software Funding. The agreement gives Dataserv a noncontrolling interest in Software Funding, a firm specializing in providing software leasing arrangements.

HUNKELER POPP
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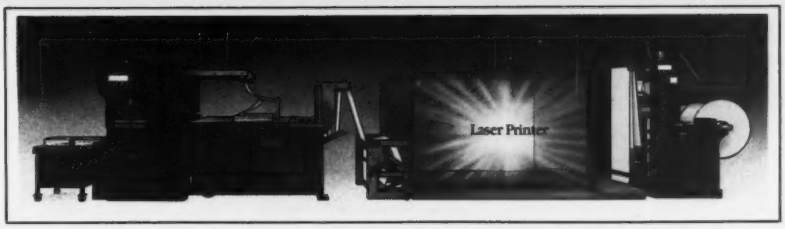

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EXECUTIVE CORNER

IBM Executive Vice-President **Kaspar V. Cassani** has been elected to the board of directors of IBM. Cassani is the corporate executive responsible for IBM World Trade Europe/Middle East/Africa Corp.; IBM World Trade Americas Group; IBM World Trade Asia/Pacific Group; and IBM's Information Systems Group.

The board elected **William W. K. Rich** as IBM secretary. Rich, who was assistant group executive for plans and controls in the Information Systems and Communications Group, will assume the responsibilities of IBM secretary on July 1.

Apple Computer, Inc. announced the promotion of **Jean-Louis Gassee** to senior vice-president of research and development. Gassee formerly served as vice-president of product development. In addition, Apple made organizational changes to combine its advanced technology and product development groups under Gassee's leadership.

Quantum Corp. announced that **James L. Patterson**, chairman, president, chief executive officer and one of Quantum's founders, is retiring from day-to-day operations. Patterson reportedly will remain on the Quantum board of directors and serve as chairman of the board for the company's subsidiary, Plus Development Corp.

Patterson will be succeeded by **Stephen M. Berkley**, who currently is president of Plus Development. Berkley has been elected chairman of the board of Quantum and will become CEO, effective immediately.

David A. Brown, another Quantum founder, has held management positions at both Quantum and Plus and will become president of Quantum. He will manage Quantum's OEM business and replaces **David B. Pratt**, chief operating officer.

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Upgrade Capacity	EMC List	IBM List	Savings with EMC
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32MB	96,000	144,000	48,000
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FROM PAGE 89

we must also seek to satisfy our own corporate goals so that we are not totally captive to IBM and so that, in the future, their decisions won't be catastrophic for us."

The most significant area of competition concerns the Catia products, which were developed by Dassault Systems in Paris and have been remarketed by IBM since 1981. When first offered by IBM, the Catia product, a 3-D package, complemented the Cadam offering, then a two-dimensional drafting package. However, Cadam soon introduced its own 3-D offering, while Dassault incorporated 2-D functionality into its product.

"There used to be a clear differentiation. Now, we have Catia pushing 2-D and Cadam pushing into the 3-D world. Obviously, they are on a collision course," said David Burdick, a CAD/CAM analyst with Dataquest.

Not complaining

At the Paris office of Dassault, Francois Denis, Dassault's communications manager, said his company is aware of the "competition inside the IBM world," but "we have nothing to complain about. Even if they were making insufficient efforts to market our product, we can't complain. We had 10 licenses sold in 1983, and today we have 250."

Analysts suggest that Cadam's direct sales effort will be a difficult challenge for the company, since it has always been a technology-driven organization. "They don't have the marketing clout of any of the other CAD/CAM vendors, let alone IBM," Dataquest's Burdick said.

A more effective means to break its ties with IBM would be to expand Cadam software to other platforms, Burdick added. "I think there's still a factor of not wanting to bite the hand that feeds you," he said, "but the rules are changing."

IDC's Brown agreed. Cadam's "major weakness is marketing. They should move to a Digital Equipment Corp. platform. IBM isn't the only platform in the world," she said.

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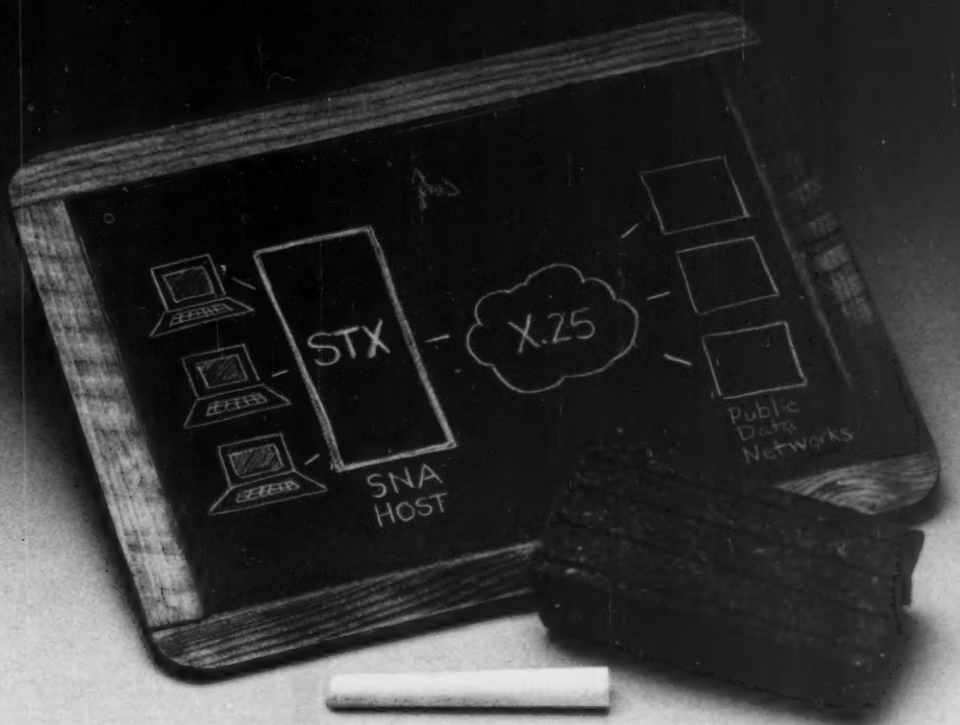

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EMPLOYMENT TODAY

New opportunities in oil patch

Petroleum firms depend on DP to keep up with times, stay in business

BY DERRICK BOOTH
SPECIAL TO CW

In March 1982, total employment in U.S. oil fields reached 619,000. In December 1985, the figure was 377,400. Today, it is stable at about 200,000. These comfortless statistics were given to a grim audience by Philip Burgieres, chairman, president and chief executive officer of Cameron Iron Works U.S.A., Inc. in Houston, at the 1987 Offshore Technology Conference held there recently.

In the same period, the price of crude oil crashed from more than $32 a barrel to almost $9. At the peak, an estimated 45,000 people were employed in data processing by the various segments of the oil industry. Today, the number stands at about 37,000 — and growing.

Despite overall industry cutbacks, these figures add up to new opportunities and bright career paths in the oil patch for DP and related staffs.

The reason is clear. Burgieres and other oil industry captains have closed plants, shut down drilling rigs and let go more than half of the 1985 payroll in an endgame to check billions of dollars in losses. But without meaningful data, automation and the full benefits of computing power, there can be no tomorrow for the oil industry.

"The oil business used to be run by sweat-and-muscle men — good old boys who hated computers and distrusted anything that came out of them," says one Houston DP manager. "Many of these people were victims of the shakeout in 1986. The newer managers come from business schools, not the rig floor. They require meaningful data. They need it fast."

Not just payroll anymore

"Data processing is no longer just running payroll, accounts receivable and keeping inventory," says a DP manager in Tulsa, Okla. "It is a powerful management tool in a fast-breaking world. Question: What happens if the price of crude goes up 3 cents overnight? We have to provide management with immediate answers."

Another DP manager with a major multinational producer in Houston says that when his company introduced a package last spring for employees to "voluntarily retire with benefits now or be let go later without," the exploration and production departments lost more than 50% of their staffs by June. His department lost only about 10%.

"We are doing more with less — the outside contractor has become almost extinct," he says. "But we are doing things today that were unheard of in 1985. We are openly encouraged to be resourceful and innovative with the powerful but underutilized hardware the company installed in the good times."

Take the case of Tom Jaquette, supervisor of engineering services in FMC Corp.'s Wellhead Division in Houston. He is responsible for an Intergraph Corp. system with 12 stations hosted by a Digital Equipment Corp. VAX-11/785.

> "THE OIL business used to be run by sweat-and-muscle men — 'good old boys' who hated computers and distrusted anything that came out of them. Many of these people were victims of the shakeout in 1986."
>
> HOUSTON DP MANAGER

The company manufactures oil tools, ranging from simple valves to complex, multimillion-dollar "Christmas trees," which produce oil from the seabed at depths of more than 300 meters.

"We invested in a graphics system about 4½ years ago, and despite the downturn, we are still growing," Jaquette says. "The reason is not hard to determine: productivity. We create a design in software, evaluate it, test it and then engineer a tool path to produce a finished product without issuing one drawing in between. There are no tryouts. The entire process — from concept to hardware — is managed inside a computer, which is insensitive to external market conditions."

Saving passing wisdom

As with so many other vendors in the oil business, FMC's Wellhead Division was forced to reduce its skilled work force to a tiny fraction of the number employed in the boom times of five or six years ago. In those days, the brains of the mature machinists and supervisors employed by the company were like mass storage devices. These men could recall instantly a part number and then find drawings and machine tapes in minutes, even after an interval of several years. The downturn removed many of these skilled people from the payrolls, and several of the survivors are now ready to retire.

Jaquette's ongoing strategy is to transfer this vital information on more than 150,000 manufactured parts to the computer so that the knowledge of these valuable employees continues to be accessible long after they have retired. "It is a complex and continuing job," he says, "but we can now access this unique catalog of group technology by an interactive Q&A session at a terminal and then turn up the design file and the production file for the Intergraph in the shortest possible time, complete with the latest edits."

By buying equipment with an open-ended architecture, Jaquette says, his department can grow to meet the increasing demand for engineering services. The addition of mass storage, plotters and workstations allows DP to keep pace with demand without degrading the system.

"Is there still enough growth for a career path in the oil industry? Yes, I believe there is," Jaquette says. "But it has shifted direction from the old concept of the DP manager's role as top of the corporate data processing pyramid to growth within interdependent satellite activities. Each satellite fulfills a very necessary function to serve a specific department, such as marketing or engineering. And each satellite has an interesting new career path potential of its own."

Booth writes from Houston about international oil industry topics.

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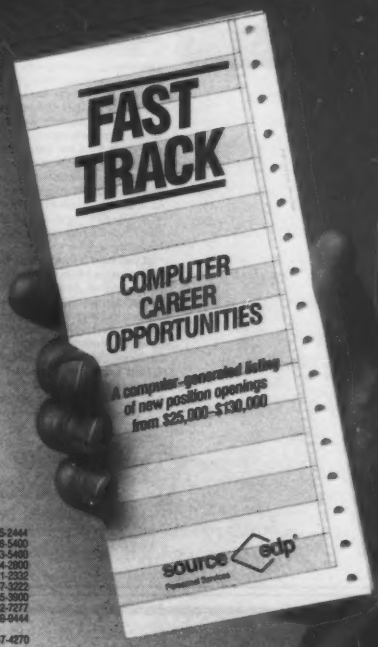
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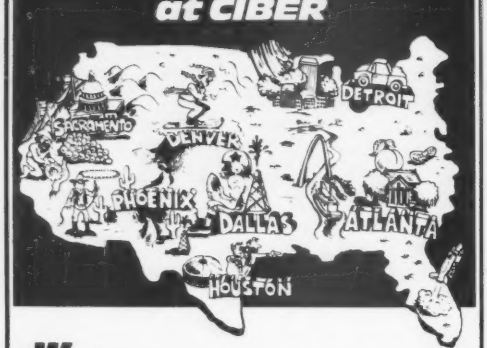

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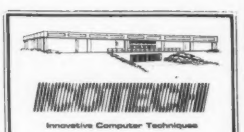

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ADVERTISERS INDEX

Advanced Computer Environments PS2
Alloy PS14
Ansa Software 30-31
Application Development Systems 50
Artificial Intelligence 63
AST Research 68-69
BASF 74
BBN Software 94
Bell Atlantic 13
B.I. Moyle 27
Bridge Communications, Inc. PS6
Business Recovery Systems 12
C. Itoh Electronics 45
Chicago Software 73
Chipcom PS15
CIE Terminals Co. 18
Cincom Systems 25,46-47
Codex PS10-11
Compuserv Data Technology 79
Computer Associates 26
Computer Tech Group 80
Corvus PS18-19
CTS PS9
Cullinet 36-37
CW Circulation PSC3
CW Focus 109
CW Spotlight PS8
CXI PS28-29
Data Access Corp. 29
Data General Corp. 39
Data Group 73
Data Language 34
Datapro 44
DataSouth 57
Dataware 81
Decision Data 60
Develcon 83
Digital Communications Associates 19,20-21,76-77
Diversified Programming Services, Inc. 33
Duquesne Systems 44,56,97
EAU U.S.A. 95
EMC 96
Exide Electronics 115
Fibronics PSC2
Fujitsu Distribution 78
Harris Corp. 10,PS22-23
Hayes Microcomputer 52
Hewlett Packard 16-17
IBM Corp. 54-55,86-87
IDEAssociates 28
Information Builders 81
Information Dimensions 32-33
Innovation Data Processing 5
Intelogic Trace 84-85
Jeyco 73
Leasametric 53
Local Data 14
Michaels, Ross & Cole 69
Micom Systems, Inc. 65
Mid-American Control Corp. 87
MSA 116
MTI PS12
Mux Labs 38
National Advanced Systems 43
NCR Corporation 48-49,92-93
NEC 70-71
Novell U.S.A. PS16-17
Nynex 82
Oracle 11
Realia 35
Retrieval Technology 14
Robert Half & Associates 62
SAS Institute 40,61
Searchlink 59
Software Pursuits, Inc. 12,13
Software Technology, Inc. 14
SPSS 90
Syncsort 3
Systems Center 88
Tandon Computers 91
Technology Concepts PSC4
Televideo Systems 66-67
3Com PS3,4-5
Timeplex 9
Tone Software 12
Tymnet 72
Universal Data Systems 58
VM Personal Computing 42
VM Software 7
Waterloo Micro Systems PS20-21
Wells America 15
Westinghouse 24
Wyse Technology 50/51

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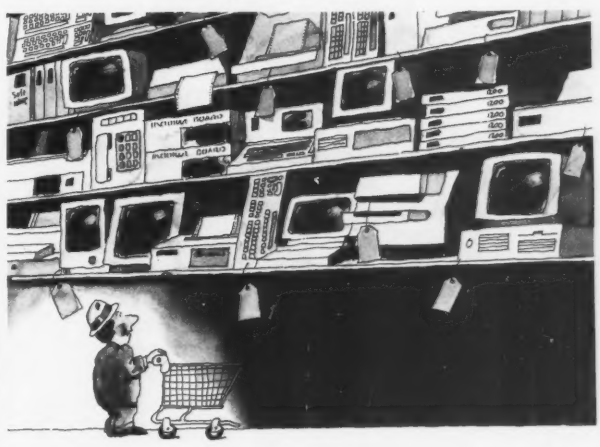
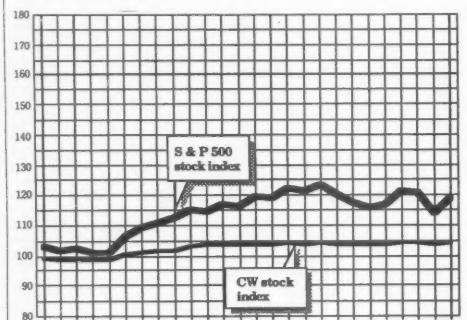


Upcoming Computerworld Spotlight Sections

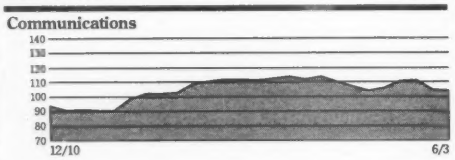
Issue Date	Topic	Ad Closing Date
July 6	Manufacturing Technology	June 19
July 13	Security Products & Services	June 26
July 20	Accounting & Financial Software	July 3
July 27	Graphics Workstations & Software	July 10
Aug. 3	Communications Software	July 17
Aug. 10	DBMS for Large & Medium Scale Systems	July 24
Aug. 17	Field Service	July 31

STOCK TRADING INDEX

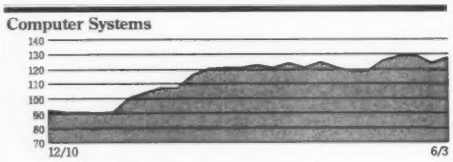


Indexes	Last Week	This Week
Communications	103.5	**104.4**
Computer Systems	127.3	**127.3**
Software & DP Services	139.1	**140.6**
Semiconductors	123.0	**122.2**
Peripherals & Subsystems	120.2	**120.2**
Leasing Companies	120.1	**122.0**
Composite Index	103.8	**103.9**
S&P 500 Index	118.4	**118.8**

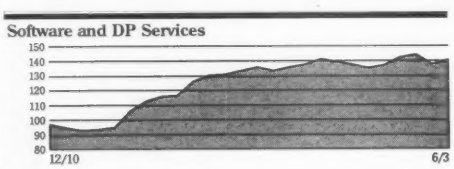
Communications



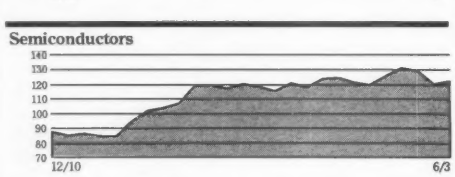
Computer Systems



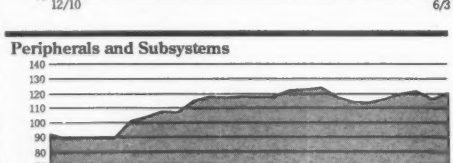
Software and DP Services



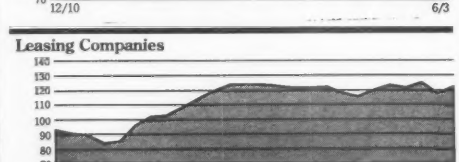
Semiconductors



Peripherals and Subsystems



Leasing Companies



CW CHARTS: SUSAN ALDAM

Computerworld Stock Trading Summary

CLOSING PRICES WEDNESDAY, JUNE 3, 1987

EXCH: N = NEW YORK; A = AMERICAN; Q = NATIONAL; O = OVER-THE-COUNTER; S = SPLIT

O-T-C PRICES ARE BID PRICES AS OF 3 P.M. OR LAST BID
(1) TO NEAREST DOLLAR

Communications and Network Services

EXCH		PRICE 52-WEEK RANGE (1)		CLOSE JUNE 3 1987	WEEK NET CHNGE	WEEK PCT CHNGE
N	AMERICAN INFO TECHS CORP	101	77	84.00	+1.9	+2.3
Q	ANDREW CORP	22	14	16.25	+0.0	+0.0
Q	ARTEL COMM CORP	6	2	2.75	+0.0	+0.0
N	AT&T	28	22	25.75	-0.1	-0.5
Q	AVANT GARDE COMP INC	7	3	3.88	+0.1	+3.3
Q	AVANTEK INC	20	13	14.38	+0.5	+3.6
N	AYDIN CORP	38	18	32.75	-1.1	-3.3
N	BELL ATLANTIC CORP	77	62	67.13	+1.6	+2.5
N	BELLSOUTH CORP	46	35	38.88	+0.8	+2.0
Q	BRIDGE COMMUNICATION	27	11	23.88	+0.6	+2.7
Q	COMPRESSION LABS INC	15	4	5.50	-0.1	-2.2
O	COMPUTER NETWORK TECH	9	4	4.50	-0.1	-2.7
Q	CONTEL CORP	35	27	30.00	+1.6	+5.7
Q	DATA SWITCH CORP	9	5	6.88	+0.1	+1.9
Q	DIGITAL COMM ASSOC	47	16	45.25	-1.0	-2.2
Q	DYNATECH CORP	44	27	30.50	+0.0	+0.0
Q	EQUATORIAL COMM CO	10	2	2.88	-0.1	-4.2
Q	GANDALF TECHNOLOGIES	11	5	8.50	+0.0	+0.0
Q	GENERAL DATACOMM INDS	15	8	12.38	+0.0	+0.0
N	GTE CORP	43	33	36.75	+0.6	+1.7
Q	INFOTRON SYS CORP	17	7	10.75	-0.3	-2.3
N	ITT CORP	66	44	56.38	+1.8	+3.2
N	M A COM INC	18	12	13.13	-0.4	-2.8
Q	MCI COMMUNICATIONS CORP	11	5	6.25	-0.1	-2.0
Q	MICOM SYS INC	18	10	14.88	+0.0	+0.0
N	NETWORK SYS CORP	19	9	9.88	+1.1	+12.9
N	NORTHERN TELECOM LTD	23	13	19.25	-0.1	-0.6
Q	NOVELL INC	27	9	24.50	+0.3	+1.0
N	NYNEX CORP	73	59	66.38	+2.8	+4.3
N	PACIFIC TELESIS GROUP	31	23	25.00	+0.8	+3.1
N	PARADYNE CORP	11	4	6.50	-0.1	-1.9
A	PENRIL CORP	8	4	4.75	-0.3	-5.0
N	PLESSEY PLC	41	24	35.00	-0.3	-0.7
N	SCIENTIFIC ATLANTA INC	19	9	17.00	+0.5	+3.0
N	SOUTHWESTERN BELL CORP	41	32	37.25	+1.0	+2.8
Q	3 COM CORP	24	9	19.88	+0.9	+4.6
N	TIMEPLEX INC	41	14	35.00	+0.8	+2.2
Q	UNGERMANN BASS INC	16	7	13.75	+0.1	+0.9
N	U S WEST INC	62	45	48.75	+0.8	+1.6

Computer Systems

EXCH		PRICE 52-WEEK RANGE (1)		CLOSE JUNE 3 1987	WEEK NET CHNGE	WEEK PCT CHNGE
Q	ALLIANT COMPUTER SYS	37	16	32.25	-0.3	-0.8
Q	ALPHA MICROSYSTEMS	7	4	3.75	+0.0	+0.0
Q	ALTOS COMPUTER SYS	17	10	12.88	-0.1	-1.0
A	AMDAHL CORP	42	16	35.88	+0.0	+0.0
Q	APOLLO COMPUTER INC	25	9	23.88	+0.8	+3.2
Q	APPLE COMPUTER INC	82	30	77.75	-1.8	-2.2
N	BOLT BERANEK & NEWMAN	60	37	45.50	+1.8	+4.0
Q	BRITTON LEE INC	7	4	4.13	+0.1	+3.1
N	COMPAQ COMPUTER CORP	51	12	47.75	+2.4	+5.2
Q	COMPUTER AUTOMATION INC	17	2	13.25	+0.3	+1.9
A	COMPUTER CONSOLES INC	12	7	10.25	+0.4	+3.8
Q	CONCURRENT COMP CORP	19	11	17.25	+0.0	+0.0
N	CONTROL DATA CORP DEL	35	20	32.63	+0.1	+0.4
Q	CONVERGENT TECH	12	4	7.00	+0.3	+3.7
Q	CONVEX COMPUTER CORP	22	8	17.63	-0.6	-3.4
N	CRAY RESH INC	136	69	98.00	-2.3	-2.2
Q	DAISY SYS CORP	13	8	8.75	-0.3	-2.8
N	DATA GEN CORP	41	25	35.63	+0.8	+2.2
N	DATAPOINT CORP	9	4	5.63	-0.1	-2.2
N	DIGITAL EQUIP CORP	175	81	158.25	-1.8	-1.1
N	FLOATING POINT SYS INC	39	10	10.50	-0.3	-2.3
N	GOULD INC	24	15	16.88	-0.4	-2.2
N	HARRIS CORP	43	27	36.00	-0.1	-0.3
N	HEWLETT PACKARD CO	67	36	66.13	+1.9	+2.9
N	HONEYWELL INC	84	58	79.75	+0.0	+0.0
N	IBM	168	116	159.63	-1.4	-0.9
Q	INFORMATION INTL INC	18	13	13.88	+0.1	+0.9
Q	IPL SYS INC	4	2	2.75	-0.1	-4.3
Q	MASS COMPUTER CORP	10	5	7.88	+0.0	+0.0
N	MATSUSHITA ELEC INDL LTD	136	77	131.25	+0.3	+0.2
Q	MEGADATA CORP	7	2	4.63	-0.2	-3.9
Q	MENTOR GRAPHICS CORP	34	11	29.88	-0.5	-1.6
N	NBI INC	14	8	11.50	+0.4	+3.4
N	NCR CORP	77	42	73.63	-1.1	-1.5
N	PRIME COMPUTER INC	30	16	26.50	-0.9	-3.2
Q	PYRAMID TECHNOLOGY	11	4	10.25	+0.0	+0.0
Q	STRATUS COMPUTER	41	18	37.75	-0.8	-1.9
Q	SUN MICROSYSTEM INC	46	11	43.63	+0.6	+1.5
Q	SYMBOLICS INC	13	4	4.38	+0.0	+0.0
N	TANDEM COMPUTERS INC	75	28	64.75	-3.0	-4.4
N	TANDY CORP	56	31	40.25	-0.3	-0.6
N	ULTIMATE CORP	33	13	24.13	+1.0	+4.3
N	UNISYS CORP	125	58	117.13	-2.1	-1.8
A	WANG LABS INC	19	11	17.88	+0.4	+2.1

Software & DP Services

EXCH		PRICE 52-WEEK RANGE (1)		CLOSE JUNE 3 1987	WEEK NET CHNGE	WEEK PCT CHNGE
Q	ADVANCED COMP TECH	6	3	4.63	+0.1	+1.4
N	ADVANCED SYS INC	22	12	19.75	+1.3	+6.8
N	AGS COMPUTERS INC	22	8	20.50	-22.1	-51.9
Q	AMERICAN MGMT SYS INC	38	13	36.00	+0.0	+0.0
Q	AMERICAN SOFTWARE INC	22	7	14.50	-1.6	-10.1
N	ANACOMP INC	9	3	8.25	+0.0	+0.0
Q	ANALYSTS INTL CORP	11	4	9.50	-0.3	-2.6
Q	ASHTON TATE	30	10	24.00	-0.8	-3.0
Q	ASK COMPUTER SYS INC	17	9	12.63	+0.4	+3.1
Q	AUTODESK INC	34	8	24.00	-1.5	-5.9
N	AUTO DATA PROCESSING	51	29	46.50	+1.5	+3.3
Q	BOOLE & BABBAGE INC	11	4	10.25	+0.8	+7.9
N	COMPUTER ASSOC INTL INC	29	10	27.13	+0.5	+1.9
Q	COMPUTER HORIZONS CORP	15	10	12.38	-0.1	-1.0
N	COMPUTER SCIENCES CORP	61	30	53.75	+2.5	+4.9
N	COMPUTER TASK GROUP INC	19	11	15.75	-0.3	-1.6
Q	COMSHARE INC	18	11	17.75	+1.8	+10.9
N	CULLINET SOFTWARE INC	16	6	12.25	+0.1	+1.0
Q	CYCARE SYS INC	17	7	7.88	+0.1	+1.6
Q	DUQUESNE SYS INC	33	12	26.50	-0.5	-1.9
Q	ENDATA INC	10	5	10.00	+0.3	+2.6
N	GENERAL MTRS (CLS E)	49	24	40.75	-1.1	-2.7
Q	HOGAN SYS INC	17	9	15.00	-0.5	-3.2
Q	INFORMIX CORP	23	7	21.25	+2.3	+11.8
Q	INTELLICORP INC	12	4	10.25	+0.0	+0.0
Q	KEANE INC	16	5	9.25	+0.0	+0.0
Q	LOTUS DEV CORP	37	9	33.13	-1.4	-4.0
Q	MANAGEMENT SCI AMER	21	12	14.00	+0.6	+4.7
Q	MICRO PRO INTL CORP	8	2	7.25	+0.2	+2.6
Q	MICROSOFT CORP	128	26	113.00	+3.5	+3.2
Q	NATIONAL DATA CORP	27	16	21.63	-0.6	-2.8
Q	ON LINE SOFTWARE INTL INC	18	6	16.63	+0.0	+0.3
Q	ORACLE SYS CORP	30	7	27.25	+2.3	+9.0
N	PANSOPHIC SYS INC	23	12	22.38	+1.1	+5.3
Q	POLICY MGMT SYS CORP	30	15	25.75	+0.5	+2.0
Q	PROGRAMMING & SYS INC	13	8	10.25	-0.3	-2.4
Q	REYNOLDS & REYNOLDS CO	42	27	34.00	+1.0	+3.0
Q	SEI CORP	35	15	33.25	+0.0	+0.0
Q	SHARED MED SYS CORP	53	23	27.50	+2.8	+11.1
Q	SOFTWARE AG SYSTEMS INC	20	10	12.13	+0.9	+7.8
Q	SOFTWARE PUBG CORP	17	5	15.13	+0.1	+0.8
A	STERLING SOFTWARE INC	21	9	10.25	+0.0	+0.0
Q	SUNGARD DATA SYS INC	21	10	18.75	-0.3	-1.3
Q	SYSTEMATICS INC	30	14	29.00	+0.0	+0.0
N	UCCEL CORP	45	18	43.63	+12.1	+38.5
N	URS CORP	21	13	16.38	+0.1	+0.8
Q	VM SOFTWARE INC	45	16	29.25	-0.3	-0.8

Semiconductors

EXCH		PRICE 52-WEEK RANGE (1)		CLOSE JUNE 3 1987	WEEK NET CHNGE	WEEK PCT CHNGE
N	ADV MICRO DEVICES INC	27	13	22.13	+1.0	+4.7
N	ANALOG DEVICES INC	24	14	21.00	-0.5	-2.3
Q	ANALOGIC CORP	13	10	10.88	+0.0	+0.0
Q	INTEL CORP	48	16	42.25	-0.3	-0.6
Q	LSI LOGIC CORP	17	8	12.88	-0.8	-5.5
Q	MONOLITHIC MEMORIES INC	19	10	18.50	+0.8	+4.2
N	MOTOROLA INC	64	34	54.88	-1.9	-3.3
N	NATL SEMICONDUCTOR	17	8	13.50	-0.4	-2.7
N	TEXAS INSTRS INC	203	103	176.75	+1.8	+1.0
A	WESTERN DIGITAL CORP	33	11	29.75	-0.5	-1.7

Peripherals

EXCH		PRICE 52-WEEK RANGE (1)		CLOSE JUNE 3 1987	WEEK NET CHNGE	WEEK PCT CHNGE
N	AM INTL INC	9	5	6.50	+0.0	+0.0
Q	AST RESH INC	23	11	19.50	-0.8	-3.7
Q	AUTO TROL TECH CORP	9	3	7.00	-0.1	-1.8
Q	BANCTEC INC	16	6	14.75	+0.6	+4.4
Q	CIPHER DATA PRODS INC	21	10	12.25	-0.1	-1.0
A	COGNITRONICS CORP	5	2	4.88	+0.1	+2.6
N	COMPUGRAPHIC CORP	24	16	23.00	-0.8	-3.2
N	COMPUTERVISION CORP	23	10	17.13	+0.3	+1.5
N	CONRAC CORP	30	12	27.13	+0.0	+0.0
A	DATAPRODUCTS CORP	18	10	10.50	+0.3	+2.4
A	DATARAM CORP	17	7	7.63	+0.3	+3.4
N	DECISION INDS CORP	15	7	7.88	+0.3	+3.3
N	EASTMAN KODAK CO	85	52	78.13	-1.9	-2.3
Q	E M C CORP MASS	34	11	26.50	-0.8	-2.8
Q	EMULEX CORP	10	5	8.00	+0.1	+1.6
Q	EVANS & SUTHERLAND	40	20	29.50	-0.1	-0.4
Q	ICOT CORP	13	5	7.00	+0.5	+7.7
Q	INTERLEAF INC	20	8	18.50	-0.6	-3.3
Q	IOMEGA CORP	13	2	3.25	-0.5	-13.3
Q	LEE DATA CORP	10	5	7.38	+0.0	+0.0
Q	MASSTOR SYS CORP	5	2	4.50	-0.3	-6.5
Q	MAXTOR CORP	34	10	30.25	+0.1	+0.4
Q	MICROPOLIS CORP	44	14	40.75	+1.0	+2.5
Q	MINISCRIBE CORP	18	5	16.88	+0.3	+1.5
N	MINNESOTA MNG & MFG CO	140	99	127.38	-2.1	-1.6
A	MSI DATA CORP	17	10	16.38	+2.1	+14.9
Q	PRIAM CORP	7	2	4.50	+0.2	+4.3
Q	PRINTRONIX INC	14	10	11.38	-0.1	-1.1
N	QMS INC	18	11	15.38	+0.3	+1.7
Q	QUANTUM CORP	35	16	21.75	-0.5	-2.2
Q	RAMTEK CORP	6	4	4.63	+0.1	+2.8
N	RECOGNITION EQUIP INC	27	10	18.50	+0.0	+0.0
Q	REXON INC	14	5	11.00	-0.5	-4.3
Q	SCAN TRON CORP	19	11	11.25	+0.0	+0.0
Q	SEAGATE TECHNOLOGY	46	10	43.25	+0.9	+2.1
N	STORAGE TECH CORP	5	2	4.00	+0.0	+0.0
Q	TANDON CORP	8	2	5.50	-0.1	-2.2
A	TEC INC	6	3	3.38	-0.1	-3.6
N	TEKTRONIX INC	43	27	34.13	+0.3	+0.7
Q	TELEVIDEO SYS INC	3	2	2.63	+0.0	+0.0
N	TELEX CORP	102	52	74.88	+0.1	+0.2
Q	WYSE TECH	34	13	33.63	+1.4	+4.3
N	XEROX CORP	81	49	76.63	-1.6	-2.1
Q	XIDEX CORP	22	12	13.25	-0.8	-5.4

Leasing Companies

EXCH		PRICE 52-WEEK RANGE (1)		CLOSE JUNE 3 1987	WEEK NET CHNGE	WEEK PCT CHNGE
N	COMDISCO INC	33	15	31.00	+1.1	+3.8
N	CONTINENTAL INFO SYS	13	7	12.88	+1.0	+8.4
Q	PHOENIX AMERN INC	8	3	5.00	+0.1	+2.6
Q	SELECTERM INC	8	5	5.13	-0.4	-6.8
N	U S LEASING INTL	53	38	49.13	+0.1	+0.3

Stock overhaul

CW's trading summary offers improved industry coverage

Maintaining a commitment to respond to changes in the MIS community, *Computerworld* has overhauled its stock trading summary to provide more relevant data on vendors of the most interest to our readers.

The most significant change is the addition of a new category, Communications and Network Services. This category includes many vendors, such as AT&T's regional holding companies, that have not been previously listed, as well as vendors that primarily focus on communications but were previously listed in other categories.

The other groupings were scrutinized on the basis of each vendor's relevance to the interests of the MIS community, as well as on vendor size, trading activity and length of time as a public company. Many new companies were added to the listings, many were deleted and some were transferred to new categories.

The stock trading indexes have been recalculated to reflect these changes. In the new indexes, the performance of the companies now included has been calculated for the last six months, retroactive to Dec. 10, 1986. Each index reflects an historical base of 100 on that date.

Hayes uncorks intros

A 9.6K bit/sec. modem highlights mixed bag

BY JAMES A. MARTIN
CW STAFF

ATLANTA — Hayes Microcomputer Products, Inc. unveiled a flurry of products last week at Comdex/Spring '87 that included a 9.6K bit/sec. modem that is said to offer the benefits of full-duplex data transmission at a lower cost.

The V-series Smartmodem 9600 is a half-duplex modem for the IBM Personal Computer and compatibles that reportedly simulates full-duplex transmission through a method of CCITT V.32 trellis-code modulation and Hayes' proprietary "fast-turnaround pingpong" technology.

According to Hayes, the high-end modem converts from transmitting to receiving over dial-up or leased lines every 20 msec. "The effect, as far as the modem is concerned, is that it thinks it can go either way," according to Larry J. Hancock, Hayes product support manager.

The Smartmodem 9600 is scheduled to be available later this month for $1,299 and $1,199 for an internal model. Competitively priced 9.6K bit/sec. modems do not offer the higher performance CCITT standard V.32 demodulation technology that the V-series modem does, according to Hancock.

'High-end PC modem'

"This is not intended to replace high-end mainframe modems," said C. G. Betty, senior vice-president of Hayes. "This is a high-end modem for IBM PC-based applications."

In addition, Hayes introduced the V-series Smartmodem 2400 in internal and external models. The V-series modems, including the Smartmodem 9600, differ from previous Hayes products by implementing the Link Access Procedure Bit-Oriented (LAPB) level of the CCITT X.25 protocol.

LAPB is said to enable point-to-point error control, is consistent with an industry standard and provides a migration for future products that more fully implement X.25.

Hayes is planning to add X.25 packet assembler/disassembler capabilities to the V-series modems later this year that allow multiple communications sessions simultaneously over one phone line, Hancock said.

Throughput boost

The V-series modems also feature adaptive data compression that reportedly can increase 9.6K bit/sec. modem throughput to 19.2K bit/sec. by compressing data into real-time algorithms and automatic negotiation between V-series and non-V-series modems. The Smartmodem 2400, set to be available this month, retails for $899 for the external model and $849 internal.

In addition, Hayes announced the following:

- The V-series Modem Enhancer, which brings V-series capabilities to any Hayes Smartmodem 1200 or 2400 external model. The enhancer has not been tested on Hayes-compatible modems, Hancock said, and is not guaranteed to work on modems other than Hayes. The $199 introductory price will rise to $349 on Sept. 30, the company said.
- A new version of its microcomputer communications software, Smartcom III. Priced at $249, Smartcom III enhancements include a menu-driven interface, on-line editing, dual-communications session capabilities and macro commands to automate repetitive tasks. Smartcom III operates on IBM PCs and compatibles running Microsoft Corp. MS-DOS 2.0 to 3.3 with 512K random-access memory. Smartcom III is available on both 3½- and 5¼-in. disk formats.

In addition, Hayes lowered prices by as much as 33% on its existing Smartmodem 1200 and 2400 products.

Best and brightest feted with CW awards

ATLANTA — More than 500 Comdex/Spring '87 attendees turned out to celebrate *Computerworld*'s 20th anniversary and to applaud winners of the newspaper's Annual Microcomputer Awards here last week. Chosen by reader ballot, the awards recognized the best microcomputer products that were introduced or significantly enhanced since Jan. 1, 1986.

After *Computerworld* founder and International Data Group Chairman Patrick McGovern reviewed the publication's colorful history, Editor in Chief Bill Laberis and Executive Editor Paul Gillin presented the awards.

The Best Microcomputer award went to Compaq Computer Corp. for its Deskpro 386 system, which was the first Intel Corp. 80386-based machine introduced by a major vendor. Accepting the award was Gary Stimac, vice-president of system engineering, who led design efforts for the system. Because of customers' constant demand for more powerful, highly compatible machines, Compaq has sold more than 30,000 of the systems but still cannot keep up with demand, Stimac said.

Toshiba America, Inc.'s Intel 80286-based T3100 system won the Best Laptop/Portable Computer award, Hewlett-Packard Co.'s Laserjet Series II was deemed Best New Laser Printer, and 3Com Corp.'s 3+ won in the Best Local-Area Network Product category.

HAL, Lotus Development Corp.'s natural language interface to its 1-2-3 program, won the Most Innovative New Software Product award; Plus Development Corp.'s Hardcard 20MB was honored as Best PC Expansion Board; and the Most Useful Micro-Mainframe Link Product award went to Digital Equipment Corp. for its VAX/VMS Services for Microsoft Corp.'s MS-DOS. DEC's VAX/VMS Services allow the firm's Vaxmate microcomputer system and other IBM Personal Computer-compatible machines to function as peers with VAX systems in a network.

The first company to purchase advertising in *Computerworld*'s initial eight-page issue in 1967 was Burroughs Corp., now Unisys Corp. since its merger with Sperry Corp. In honor of that vote of confidence, McGovern presented a plaque to Unisys Vice-President Steve Baxter.

Winners of the *Computerworld* Annual Microcomputer Awards for 1987: *(left to right) Roger Archibald, product marketing manager, HP; John T. Rose, group manager of Personal Computing Systems Group, DEC; Daniel M. Crane, vice-president of marketing, personal computers, Toshiba; John E. Rehfeld, vice-president and general manager, Toshiba; Stephen Baxter, vice-president of value-added marketing, Unisys; Hank Chesbrough, manager of product marketing, Plus Development; Robert D. Bressler, vice-president and general manager of Software Products Division, 3Com; Bill Gross, developer, Lotus.*

Ashton-Tate

FROM PAGE 1

using other vendors' programs, including Dbase III.

Walker revealed few details about the forthcoming products. He said, however, that they would provide more features than TAC and would also work on DEC VAXs.

A simpler data extraction product for IBM's System/36 has already been released quietly in England and is slated to arrive at American shores later this year.

"It is vital for Ashton-Tate to develop a presence in this market," said analyst Michael Goulde of The Yankee Group in Boston.

Micro-to-mainframe products coming out of companies like Microsoft Corp. and Lotus indicate that Ashton-Tate has little chance of maintaining its market share in the next year without micro-to-mainframe products, Goulde added.

Entrepreneurial project

The product released in England, called Dbase Direct/36, is Ashton-Tate's first to link micros with larger systems. "The whole project was an entrepreneurial one within Ashton-Tate . . . It is not part of our overall strategic approach," Ashton-Tate President Luther Nussbaum said.

However, Walker said the System/36 software was codenamed "Trailblazer" while in development.

According to Walker, the Dbase Direct/36 will probably be dubbed Dbase Access/36 in the U.S. It was conceived by employees in Ashton-Tate's British development office. The employees proposed it to management and got funding from Ashton-Tate to build it, Nussbaum said. The product, which will not be released in the U.S. until distribution channels are set up later this year, will be joined at some time in the future by a System/38 release, Nussbaum added.

A healthy sign

Ashton-Tate's foray into the minicomputer world is a healthy sign for the firm, said Mike Cohn, market analyst at Input, a Mountain View, Calif., management consulting company. "A number of companies now such as Relational Technology, Inc., Oracle Corp. and Informix Software, Inc. build for the micro, mini and mainframe world, and that is what MIS wants," he said.

"Ashton-Tate has been a bastion of microcomputing function, but it has needed to break out to take advantage of minis," Cohn added.

> "ASHTON-TATE has been a bastion of microcomputing function, but it has needed to break out to take advantage of minis."
>
> MIKE COHN
> INPUT

In the past, Ashton-Tate has been known to be tentative about its intentions in the minicomputer market.

Last fall, the company said it was shopping for a vendor of database software for minicomputers. However, it has not yet made any acquisitions in that area.

Ashton-Tate has also discontinued a project it acquired with Multimate International Corp. nearly two years ago to port the Multimate word processor to the System/36 and 370 mainframes.

Users of the Dbase Direct/36 can identify and extract data from the System/36 data base, and bring that data to the PC, said Eric Kim, director of product marketing for Ashton-Tate. However, uploading to the System/36 is not permitted, Kim said.

Dbase Direct/36, which costs the equivalent of $913, requires an IBM 5250 terminal link and allows users to find and download relevant records on the System/36.

Senior Editor Douglas Barney contributed to this report.

IBM halts XT orders; AT line could be next

BY DAVID BRIGHT
CW STAFF

IBM late last month notified computer dealers that it had stopped taking new orders for its low-end Personal Computer XT models. In addition, some sources said IBM plans to start phasing out its PC AT line by August.

These actions could prod potential XT and AT customers who had been taking a wait-and-see attitude to buy the Personal System/2 machines.

"IBM is forcing people to move to the PS/2," said Jim Davison, division manager for Southwestern Stationery and Bank Supply, Inc., which operates two stores in Ponca City, Okla. "I had several large orders, totaling almost 150 XT units, that I could not fill because I could not get the machine."

In a letter to dealers dated May 29, IBM said it would "no longer schedule new and additional orders" for the floppy disk drive-based XTs, an IBM spokesman confirmed. The company has also been substituting the XT Model 286 for the 20M-byte hard-disk version of its XT in dealer orders because the latter machine is in short supply, the spokesman said. He declined to say whether IBM is still making the machines but said that the only XT system not in short supply is the Model 286.

The spokesman said he had no knowledge of IBM planning to take the last AT orders in August. He said IBM had recently increased the production of the AT Model 339, which comes with a 30M-byte hard disk drive.

Conflicting answers

One independent dealer said IBM had assured him that it would supply him with ATs "for a good time coming." But at the same time, he said, IBM told some large customers that it would stop taking orders in August and discontinue the line by the fourth quarter.

Another dealer claimed that IBM would discontinue the AT as soon as the PS/2 Models 60 and 80 move into full production, which should be before the fourth quarter. He agreed IBM is pushing customers to buy the PS/2 systems and added that the strategy is working.

At the Home Insurance Co. in New York, Tony Graffeo, senior vice-president of information services, said the PS/2 Model 60 is his preferred machine but, for the time being, he will stick with the AT. "The ATs are serving our needs. We will buy them for as long as we can get them," he said.

One reason for waiting is the PS/2 Model 60's higher price tag, Graffeo said. Model 60 prices start at $5,295, while the AT Model 339 lists for $4,595.

IBM details Database Manager

Feature-rich data base scheme to offer multiuse record locking

BY DOUGLAS BARNEY
CW STAFF

ATLANTA — Refuting criticism that the Database Manager component of its OS/2 Extended Edition would be short on features, IBM last week detailed a multiuser, multitasking product that will provide applications development tools and functionality typically found in mainframe and minicomputer data base systems.

At a technical seminar at Comdex/Spring '87, IBM officials described an ambitious full-feature, relational, SQL-driven multitasking data base with multiuser capabilities such as record locking and concurrent access to data. However, they did not shed any light on IBM's plans for delivery of the product, which they said will come standard with the $795 OS/2 Extended Edition. Shipping dates are expected to be released in the fourth quarter.

Perhaps the most unexpected element of the Database Manager is the multiuser capability of the IBM product, which will include full password security features and concurrent access to data. "This is a multitasking, multiuser data base manager. We use locks to provide concurrency control for the Database Manager," said Jerry Ronga, advisory planner for the product planning department of IBM's Entry Systems Division in Austin, Texas.

Through its SQL combined with its Communications Manager component of OS/2, IBM said it also hopes to provide transparent access to a variety of applications.

"If you are building an application and don't know whether it is going to run in a configured environment like a local-area network or a stand-alone environment, you needn't worry. As long as you use the SQL interface, it will take a look at what data base you are using, go to our node and data base directories and determine where that data base is," Ronga said.

According to Ronga, access to remote and local data bases will be transparent to the user and the application.

"If it is local, we send you right to the local data base. If it is remote, we establish communications using the Communications Manager and the Advanced Program-to-Program Communications between our server and a remote node," he said.

Data base functionality

Many observers said they initially believed that the Database Manager would lack the features of a more full-function data base, particularly networking and applications development tools.

But IBM said that, in addition to SQL, the Database Manager will eventually support several languages for applications development, including C, Pascal and Cobol. The C language reportedly will be supported in the initial release, while Pascal and Cobol are planned enhancements.

IBM's precompiler approach to its language implementation will allow programmers to embed SQL statements within the languages, shielding users from the complexity of SQL syntax.

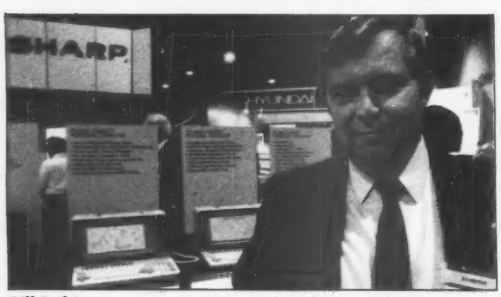
In addition, a variety of data types will be supported. "We have many data types that allow you to build a wide variety of applications. These include characters — both fixed and variable character formats. We also provide a long variable character, which is 32,000 bytes, which is consistent with that of DB2," Ronga added.

The record-length limit will be 4,005 bytes and will support 255 characters per record, Ronga said.

The long variable-character format will provide users with flexibility in what kind of data the system stores, IBM claimed. "With this data type, we can support image, audio, graphics images and other forms of complex data," Ronga said.

The full IBM Systems Application Architecture compatibility and the ability to retrieve data from IBM host systems show that IBM has big plans for its Database Manager.

"It is the foundation for distributed data management, future distributed data networks," Ronga said.



Bill Robinson, *general manager of the Systems Division at Sharp Electronics Corp., displays a few of the firm's portables.*

ITT announces 386 systems

TEMPE, Ariz. — ITT Systems, Inc. last week unveiled its first family of Intel Corp. 80386-based microcomputer systems for multiuser and local-area network (LAN) environments.

The company also announced its ITT Information Systems division has been renamed Xtra Business Systems and that ITT Courier Terminal Systems will now be called Courier Information Systems. Those divisions will operate under the umbrella of ITT Systems.

Xtra Business Systems announced products last week at Comdex/Spring '87 that include the 80386-based Xtra Multiple-User series of microcomputer systems for multiuser and LAN environments and the Xtra/Professional Series, which is based on Intel's 8088, 80286 and 80386 microprocessors.

Each workstation will support Microsoft Corp.'s MS-DOS 3.3, according to the vendor.

Access keys communications tool

BY PATRICIA KEEFE
CW STAFF

ATLANTA — The much awaited Communications Manager portion of IBM's OS/2 Extended Edition will open access to a wide variety of IBM and other systems, providing comprehensive communications capabilities, according to details released at an IBM seminar at Comdex/Spring '87 last week.

Functions now available in various IBM PC-DOS communications programs will soon operate with the added benefits of multitasking, expanded memory, common displays and enhanced usability, according to an IBM handout. Productivity will be enhanced through multiple concurrent communications connections, IBM claimed. The Communications Manager will incorporate capabilities provided by a variety of other personal computer programs, such as the IBM 3270 communications family, Advanced Program-to-Program Communication/PC and other asynchronous terminal emulations.

"You could literally be communicating over asynschronous lengths, a LAN [local-area network] and a 3270-PC at the same time," said speaker Joyce Breese, a senior planner of product operations for IBM's Entry Systems Divisions in Austin, Texas. The Communications Manager component will make the PC and Personal System/2 " full-fledged partners in the network," Breese said.

Programming interfaces will be available to help migrate existing programs, facilitate programmer productivity in applications development and allow programs to take advantage of the power of an IBM PC or PS/2, IBM said.

Other functions include keyboard remapping, file transfer and concurrent emulation support for multiple terminal types.

Highlights outlined in the seminar include the following:

- Local and remote connectivity, including Synchronous Data Link Control, Distributed Function Terminals mode, IBM's Token-Ring and PC Network LANs and asynchronous links. Protocols used include LU6.2, 3270-PC data stream (LU2) and asynchronous communications.
- IBM 3101 and Digital Equipment Corp. VT100 emulation by PCs and PS/2s.
- Network management support for IBM 370 host networks.
- File transfer. Text or binary files can be moved to and from an IBM host, PC, PS/2 or another supported non-IBM host. The 3270-PC File Transfer Program works with both 3270 terminal and asynchronous emulation.
- Problem determination. Functions for gathering and processing problem determination are provided, including trace-programming interfaces, data units and system events; displaying and printing all or selected error logs from file; and system dumping and displaying messages.
- Subsystem management. A systems administrator can control and gain status information about Systems Network Architecture resources maintained by the system.

New MIS show readied for launch in spring

BY DAVID BRIGHT
CW STAFF

ATLANTA — Having been rejected in its offer to help revitalize the ailing National Computer Conference (NCC), the sponsor of the Comdex reseller shows has decided to launch a computer show geared toward DP and MIS professionals.

Dubbed WCC, for World Congress on Computing, the first show will be held March 28-31, 1988, in Chicago concurrently with the Interface '88 communications show, said Sheldon Adelson, president of The Interface Group, Inc.

According to Adelson, who made the announcement at Comdex/Spring '87 held here last week, WCC is for "everybody from the programmer to the chief information officer" and will feature a range of equipment and services.

General shows finished?

But Adelson maintained that it will not be a general-purpose show. "The day of the all-purpose ... nonfocused show is over," he said. The Interface Group hopes to attract executives and managers from organizations such as international corporations, government and transportation companies.

Adelson said The Interface Group had been approached last fall by NCC's sponsor, the American Federation of Information Processing Societies (AFIPS), for the purpose of merging NCC with Comdex. But he claimed that AFIPS "made too many demands" and wanted to "take control of the show."

However, in a separate interview, AFIPS President Jack Moshman said that Adelson had initiated the negotiations. "I received a call from Adelson that was unsolicited by me or, to my knowledge, anybody in AFIPS," Moshman said. "An exhibitor may have sicced him on me, but it was not anything that AFIPS initiated."

One thing Adelson and Moshman did agree on is that a merger seems extremely unlikely. "They made a proposal which we found to be completely unacceptable, and nothing went further than that," Moshman said. "They, in effect, said, 'Look how wonderful we are. We will take over NCC. You can run the technical conference, and we'll do everything else. Wouldn't that be a wonderful deal?' My response was, 'No.' "

PS/2 bus hinders add-ons

BY JAMES A. MARTIN
CW STAFF

Although IBM has said it plans to support third-party add-in products for the Personal System/2 line, some add-on vendors claim IBM wants to keep much of that business for itself and also make things difficult for second-tier add-in vendors.

What makes it difficult for board makers is the design of the setup program used in IBM's Micro Channel architecture. The program is one-dimensional in concept, which creates conflicts when trying to address the ports of a multifunction card.

This technical impedance will cost many smaller board manufacturers significantly more time and money — two resources they cannot easily afford — to develop products for the new architecture.

Complicated process

"To develop a multifunction board in the old days, you only needed two good hardware engineers. Now, you need software and firmware engineers to figure out the specific queries by the computers [PS/2 series] during power-up," said Tom Yuen, a cofounder of AST Research, Inc. "You are no longer talking about a one- or two-man garage shop."

With the add-in market becoming lucrative during the last few years, IBM wants more control over that market, Yuen and other board makers said. They said they believe IBM will do so by financially eliminating smaller makers and deal with a handful of the major manufacturers that have the resources to produce high-end value-added products. "IBM is going after a narrow but profitable market that is quality-conscious and will pay higher premiums for quality products," Yuen said. "But they also recognize that they need add-in people to customize products to get them into new vertical markets."

Another board maker, Quadram, in order to circumvent any potential port addressing conflict in the Micro Channel, is assigning two address identification numbers to each of its Quadboard PS/Q multifunction boards, announced last week at Comdex/Spring '87 in Atlanta. The company assigns one number for each function the board performs, according to James Lindenmayer, a systems manager for Quadram. "The Micro Channel setup program is one-dimensional in its thinking, but there are ways around it," said Venkat Mohan, Quadram's vice-president of operations. "I can't tell you we have entirely solved the problem, but I think we can get around it."

Quadram's identification numbers have not been recognized yet by IEM. The problem is that IBM has not been helpful in issuing those numbers or in other third-party development efforts for add-in cards, according to Lindenmayer.

"There were several minor things in the PS/2 technical references that were incorrect, but that made it more difficult to develop a board," he said.

No formal procedure

Quadram officials were unable to talk to IBM about the certification numbers until the Comdex/Spring '87 show. "Basically, they don't have a formal procedure for this process yet," Lindenmayer said, "and that's why it's going to be a tough situation."

IBM officials have said they fully intend to support third-party board development for the PS/2 line and have not been informed of any problems experienced by vendors in acquiring identification numbers for their products.

Quadram is not planning to ship its Quadboard PS/Q until early October because of part inavailability, so that leaves time enough to reassign secondary ID numbers, if necessary, Lindenmayer added.

PS/2-host links arrive

BY ELISABETH HORWITT
CW STAFF

ATLANTA — Digital Communications Associates, Inc. (DCA) announced PS/2 versions of both its IBM 3270 and 5250/90 terminal emulation products for IBM's Personal System/2 family at Comdex/Spring '87 here last week.

The company also introduced Windowlink, software that allows 3270-based micro-to-mainframe links to run under Microsoft Corp.'s multitasking Windows, and Macirma, which is said to allow Apple Computer, Inc. Macintoshes to access IBM mainframes.

This month's release of Irma 2, a software-loaded version of the Irma line of 3270 terminal emulation boards, is said to support only IBM Personal Computers and the PC-compatible PS/2 Model 30.

However, a second release — slated for shipment this fall — includes a hardware board that was designed to interface with IBM's new Micro Channel bus for PS/2 Models 50, 60 and 80, according to DCA.

Irma 2's software-loading feature makes it easier for users to upgrade the board — for instance, in moving from Control Unit Terminal emulation to Distributed Function Terminal emulation, DCA said. The product is priced at $1,195.

PS/2 version of Smart Alec

DCA also introduced a PS/2 Micro Channel version of its Smart Alec 5250/90 terminal-emulation board. The current product allows IBM PCs to access IBM System/34, 36 and 38 hosts.

Priced at $895, the new version provides the same capability for PS/2 Models 50, 60 and 80. It is scheduled for third-quarter availability.

While one of DCA's competitors, Novell, Inc. subsidiary CXI, Inc. has announced that its software-based micro-to-mainframe link now runs on the PS/2 Micro Channel models, the firm has no immediate plans to announce a direct hardware connection, according to CXI Vice-President of Marketing Thomas Williams.

Scheduled for availability in early fall and priced at $1,195, Macirma provides "the full functionality of Irma on a Macintosh," according to John Bacon, vice-president of marketing for DCA's personal computer communications group.

DCA currently supplies Apple with the Appleline Macintosh-to-IBM mainframe link. However, the Macirma expansion card, which fits directly into the Macintosh, provides faster throughput than the Appleline box, which links up to Macintoshes over an asynchronous RS-232 link, Bacon claimed.

A fourth DCA announcement, Windowlink, is a software product that allows Irma IBM 3278 and 3279 terminal emulation or micro-to-mainframe file-transfer sessions to run concurrently with multiple PC applications under Windows.

Scheduled for availability in early fall, Windowlink is said to run on a PC equipped with Irma 2, Irma or Forte PJ.

The package is priced at $195.

Kaypro Corp. President
David Kay shows off the new Kaypro 2000+ laptop computer.

AT&T rethinks Starlan

Dim sales, low dealer support plague LAN

BY PATRICIA KEEFE
CW STAFF

ATLANTA — Plagued by lackluster sales of its work group Starlan local-area network, AT&T is rethinking its marketing strategy and reevaluating Starlan software, according to sources and comments made by an AT&T executive.

Starlan is most seriously hampered by limited dealer support and reports of performance problems related to network software, which is a mixture of internally developed AT&T drivers and software purchased from 3Com Corp. in Santa Clara, Calif.

Anemic Starlan sales are strongly tied to AT&T's reseller force, according to John Boyd, vice-president of sales and marketing for AT&T's Data Systems Division, at Comdex/Spring '87 here. "An insignificant number of our 1,300 authorized resellers — less than 100 — sell Starlan," he said.

This is important because AT&T has found that the Fortune 500's attitude toward vendors is driven by their share of the distribution channels. "Large corporate customers shop the dealers, although they don't necessarily buy from them," Boyd said, acknowledging that the market leaders are small companies such as 3Com and Novell, Inc.

AT&T hopes to combat its weakness in the dealer channel by offering dealers free hardware and software to set up AT&T Network Centers in their stores, Boyd said. These centers should be in place by the end of the month. "We have got to get [our] dealers to market Starlan," he said.

What is less obvious, according to sources close to AT&T, is vendor discontentment with Starlan software. "3Com and AT&T have different objectives and strategies," said one source, adding that the two vendors have diverged on IBM Netbios implementations.

3Com and AT&T executives have denied there are problems. But in an earlier interview, Robert Bressler, 3Com's vice-president and general manager of the software products division, confirmed that the OEM relationship has yielded fewer sales than 3Com anticipated.

DEC, Cray forge supercomputer link; VAX, X-MP units will be connected

BY JAMES CONNOLLY
CW STAFF

NEW YORK — Digital Equipment Corp. built a strategic alliance with the leading supplier of supercomputers last week with a joint development and marketing agreement centered on an interface between DEC's VAX minicomputers and Cray Research, Inc.'s Cray X-MP supercomputers.

The DEC VAX Supercomputer Gateway is a 3M byte/sec. memory-to-memory interface via the DEC VAXBI bus. It makes it more efficient to use a DEC VAX 8250 as a front-end processor for an X-MP and for the supercomputer to communicate with other systems through DEC Vaxcluster and Decnet connections. Those links were possible before but are now five times faster, DEC claimed.

DEC built the hardware, and Cray is providing its existing Vaxstation software.

Robert M. Glorioso, vice-president of DEC's High Performance System Group, emphasized DEC's new ability to provide computing power ranging from the desktop to the supercomputer level.

Exposure is the key

Bruce Kasson, Cray vice-president for Marketing Customer Operations, said the key for Cray is the ability to expose more users to the firm's products. He said the interface has not been tested on the Cray-1 or high-end Cray-2. He said Cray has 168 systems installed worldwide, about 100 of those being X-MPs.

Kasson said VAX users would see an improvement in the speed with which their jobs are returned from an X-MP. The five-fold performance claim is based on comparisons with third-party links such as the Network Systems Corp. Hyperchannel, Glorioso said.

Kasson declined comment when asked about speculation that Cray plans a similar pact with IBM, other than to say the DEC contract is nonexclusive.

Cray has said 35% of its systems use IBM front ends and 30% use VAXs.

Analysts said they expect little direct revenue impact from the interface. "A number of users would like a higher speed connection between DEC and Cray, but I don't foresee much in the way of DEC's incremental revenue. It is more of a strategic issue of aligning with Cray," said George Weiss, program director of small systems services for the Gartner Group, Inc., a Stamford, Conn.-based market research firm. "DEC wants to make themselves known to the world as connecting to more systems than anyone else," Weiss said, noting the interface could be an account control to keep users from moving to IBM.

Weiss added that while DEC and Cray officials promoted use of the interface in interactive environments, it appears to be more of a batch-file transfer product at this point.

The hardware portion of the gateway, including the 8250, costs $180,000. The Cray Vaxstation software costs $2,500 per month.

Gigamos's $3.25M offer wins Lisp

BY STANLEY GIBSON
CW STAFF

BOSTON — Gigamos Holdings, Inc. in Montreal is set to acquire the assets of Lisp Machines, Inc. The transaction was reportedly approved by the U.S. Bankruptcy Court in Boston, where Lisp Machines last month filed for protection from its creditors under Chapter 11 of the U.S. Bankruptcy Code.

In a sealed bid, Gigamos offered $3.25 million. The two other bidders, Data General Corp. and Symbolics, Inc. in Cambridge, Mass., both reportedly made final bids of less than $1 million. DG had initially bid $1.5 million.

"The court approved our entering into an agreement with Gigamos," said Patrick Kareiva, temporary president of Lisp Machines. Since the bid was approved on May 22, Gigamos has been paying Lisp Machines' day-to-day expenses.

Gigamos must either close the acquisition or walk away from the company by June 8, according to Kareiva.

President shuffle

Kareiva, an industry consultant specializing in mergers, acquisitions and restructuring, was installed as president after Lisp Machines' bankruptcy filing. He said he will remain with Lisp Machines for about two weeks after the company's assets are acquired.

Lisp Machines' previous president, Ward MacKenzie, has since joined DG as head of a new value-added reseller division at that company.

Gigamos is a holding company for several Canadian high-technology subsidiaries, among them Lisp Machines of Canada.

There is a verbal agreement in place under which all employees will be fired by Lisp and then rehired by a new company, reportedly to be called Gigamos Systems, Inc.

Lisp Machines now has 40 employees. One year ago, the company had 250 employees.

If the deal goes through, the new company will reportedly remain in Cambridge, with a development group located in Lowell, Mass.

Gigamos Holdings could not be reached for comment.

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INSIDE LINES

Shades of "A Space Odyssey." NASA has expanded its AI research, reportedly in hopes of applying AI to all phases of space missions, particularly the U.S. space station. NASA wants an "executive controller" to oversee on-board temperature and power systems and to free astronauts from housekeeping chores. Symbolics, the University of California and NASA are working to develop — by 1994 — a parallel processor small and light enough to be carried into space.

Why not the best? AT&T is touting its PC 6310 — the AT&T PC with the IBM AT-compatible bus — as a "finer implementation of the Model 30 at a lower price." It's not often that AT&T can boast of being the less expensive offering. A company executive revealed the recently introduced 3B2 600 is AT&T's hottest seller, followed by the PC 6300. "New life and credibility have been bestowed upon the 8086," the executive observed.

Blue humor. A running gag at Comdex/Spring '87 concerned the OS/2. The "2," the story goes, stands for the two-year wait.

Rotten at the core? Candidates to supply screen technology for Apple's latest laptop project may find this interesting. Woodside Design, a small start-up in Redwood City, Calif., has sued Apple for $1 billion for reneging in 1985 on an alleged commitment to purchase the firm's flat-screen technology for use in a portable Macintosh slated for a 1988 release. According to court documents, the laptop project was at the core of the bitter feud between deposed Apple Chairman Steve Jobs and current President John Sculley. The suit promises to reveal the story behind that story. Jobs, who reportedly favored the project, is being sued for an additional $1 million under the suit, along with Sculley and three other Apple executives.

The Detroit shuffle. GM is preparing next month to publicly unveil its first full-production factory network based on MAP. Its truck and bus facility in Pontiac, Mich., uses MAP 2.1 and is currently producing 55 trucks per hour, a GM spokesman said.

We don't do supers (nudge, nudge, wink, wink). IBM's emphasis on the scientific and engineering markets continued last week with the announcement that the company has established advanced computing centers for development of numerically intensive computing (NIC) applications in Rome and Tokyo. IBM, which kicked off a push into the technical markets about two years ago, had announced NIC centers for Kingston, N.Y., and Palo Alto, Calif., in 1986. The Rome and Tokyo centers reportedly will be built around IBM 3090 Model 600E mainframes with vector processor facilities.

Hold the presses. Ashton-Tate is getting ready to launch Byline, a text-based, traditional desktop publishing package, on June 23. The initial ship date was May 19.

Big eyes and bigger pockets. Continental Information Systems' $50 million bid for CMI may be only the big-splash beginning of an acquisition binge for the Syracuse, N.Y.-based computer lessor. With recent success in the financial markets, publicly traded CIS reportedly has a cash hoard of about $100 million to spend and is eyeing several other independent leasing firms in addition to CMI.

We'll use that RT yet. Despite statements that TCP/IP is only an interim networking solution, IBM revealed last week at least tentative plans to use the de facto standard to link its hosts with non-IBM systems — with the IBM 9370 acting as a go-between. A presentation chart shown at a consultants meeting illustrated an IBM RT PC passing TCP/IP transmissions between an Ethernet and an IBM Token-Ring. A 9370 VM machine on the Token-Ring then took the TCP/IP transmissions, translated them to VTAM and passed them on to an IBM 3090 mainframe. One caveat: The diagram was labeled "OEM connectivity," which probably means you have to write your own software before the thing works, reported Architecture Technologies' senior systems specialist Scott Haugdaul.

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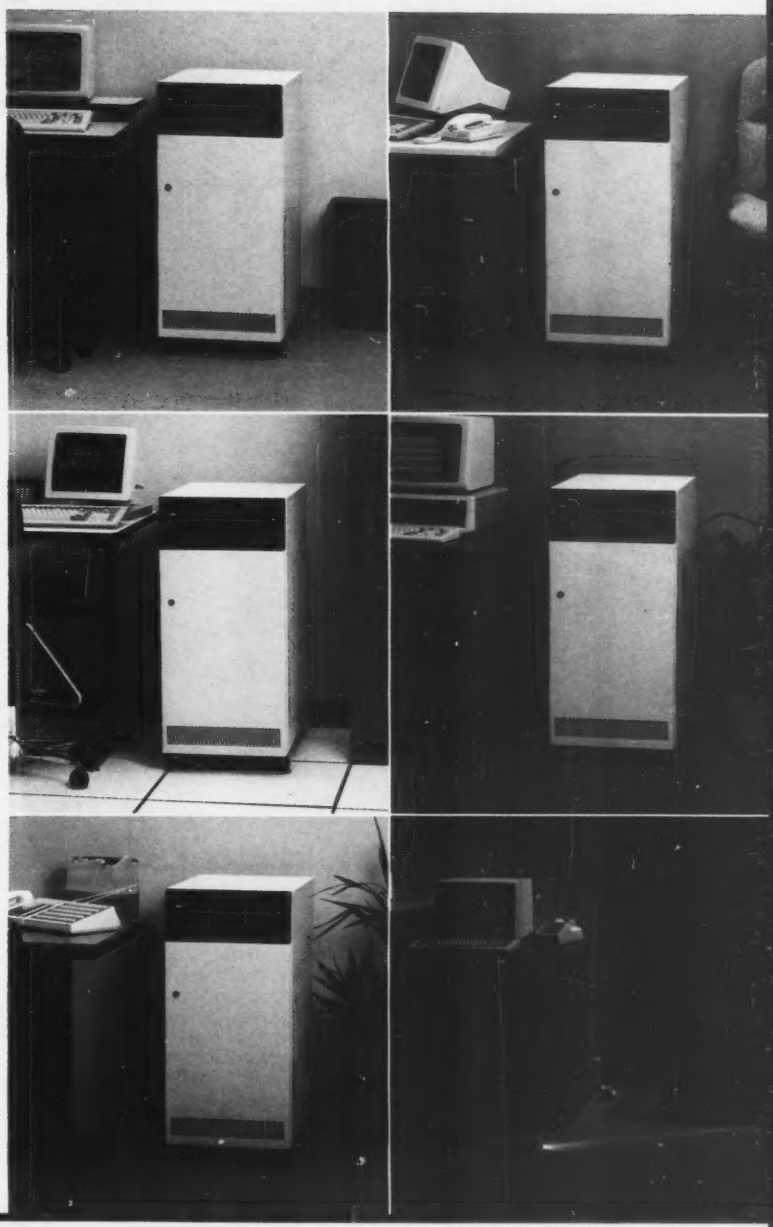

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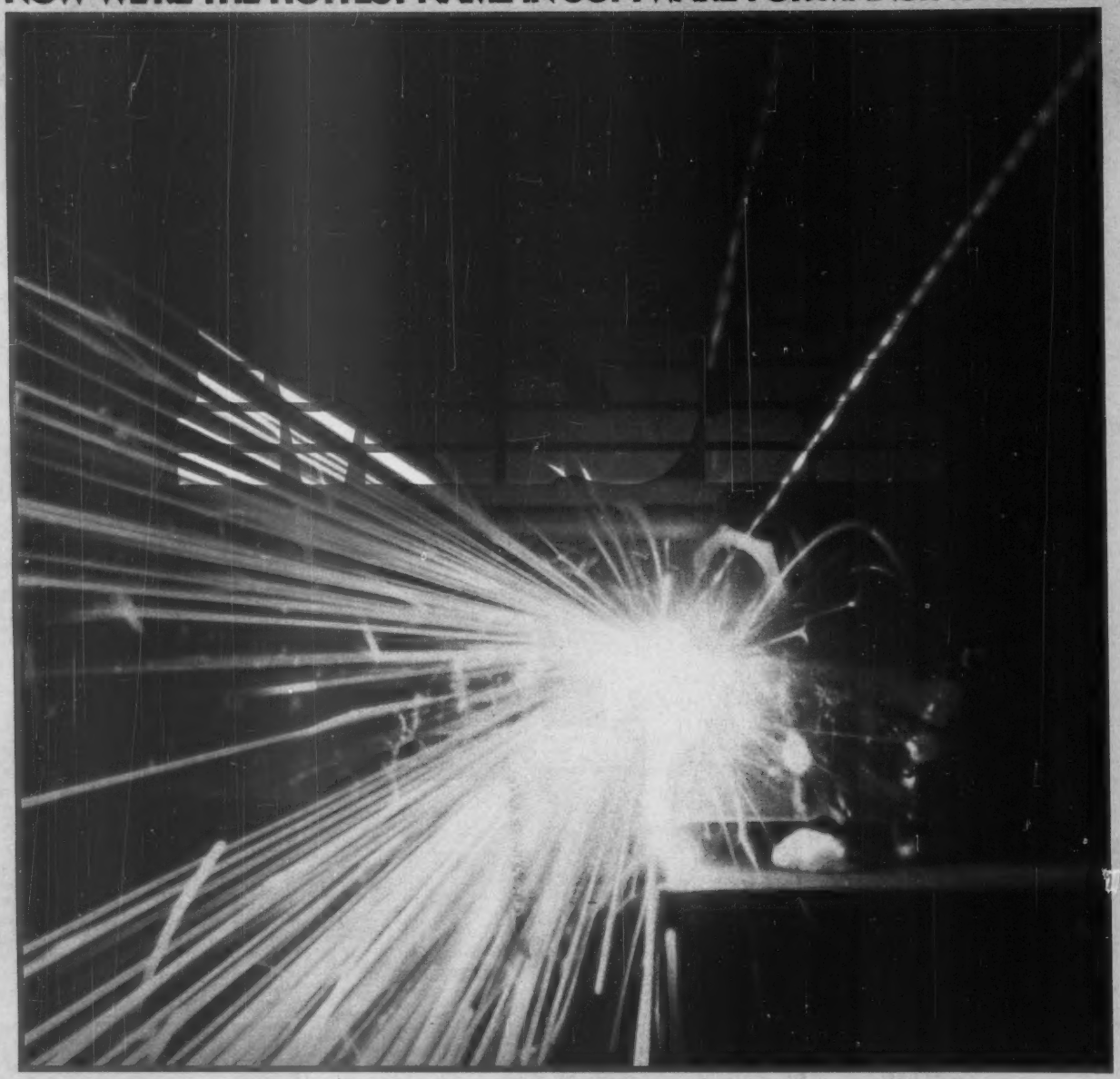

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